Layer 2 Ethernet Switch

AT-8000S Series

User's Guide

Allied Telesis

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Preface

This guide contains instructions on how to configure an AT-8000S Series Layer 2+ Fast Ethernet Switch using the interface in the *Embedded Management System* (EWS).

The Embedded Management System enables configuring, monitoring, and troubleshooting of network devices remotely via a web browser. The web pages are easy-to-use and easy-to-navigate.

This preface provides an overview of the Web Browser Interface User's Guide, and includes the following sections:

- Web Browser Interface User's Guide Overview
- Intended Audience

Web Browser Interface User's Guide Overview

The Web Browser Interface User's Guide provides the following sections:

- **Section 1,"Getting Started"** — Provides information for using the Embedded Web Management System, including adding, editing, and deleting configurations.
- **Section 2, "Defining System Information"** — Provides information for defining basic device information.
- **Section 3**, **"Configuring System Time"** — Provides information for configuring Daylight Savings Time and Simple Network Time Protocol (SNTP).
- **Section 4, "Configuring Device Security"** — Provides information for configuring both system and network security, including traffic control, and switch access methods.
- **Section 5, "Configuring Ports"** — Provides information for configuring ports, port aggregation, port mirroring and LACP.
- **Section 6, "Configuring Interfaces"** — Provides information for defining ports, LAGs, and VLANs.
- **Section 7, "Configuring System Logs"** — Provides information for setting up and viewing system logs, and configuring switch log servers.
- **Section 8, "Configuring Spanning Tree"** — Provides information for configuring Classic, Rapid, and Multiple Spanning Tree.
- **Section 9, "Configuring Multicast Forwarding"** — Provides information for configuring both the static and dynamic forwarding databases.
- **Section 10, "Configuring SNMP"** — Provides information for configuring SNMP access and management.
- **Section 11, "Configuring Power Over Ethernet"** — Provides information for configuring Power over Ethernet (PoE) on the device.
- **Section 12, "Configuring Services"** — Provides information for configuring Quality of Service CoS parameters.
- **Section 13, "Managing System Files"** — Provides information for managing system files.
- **Section 14, "Viewing Statistics"** — Provides information about viewing device statistics, including Remote Monitoring On Network (RMON) statistics, and device history events.
- **Section 15, "Managing Stacking"** — Provides information for stacking, including a stacking overview.

Intended Audience

This guide is intended for network administrators familiar with IT concepts and terminology.

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Document Conventions

This document uses the following conventions:

Note

Provides related information or information of special importance.

Caution

Indicates potential damage to hardware or software, or loss of data.

Warning

Indicates a risk of personal injury.

Contacting Allied Telesis

This section provides Allied Telesis contact information for technical support as well as sales or corporate information.

Online Support You can request technical support online by accessing the Allied Telesis Knowledge Base from the following web site: **www.alliedtelesis.com/kb**. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

Email and Telephone Support For Technical Support via email or telephone, refer to the Support & Services section of the Allied Telesis web site: **www.alliedtelesiselesis.com**.

Returning Products Products for return or repair must first be assigned a Return Materials Authorization (RMA) number. A product sent to Allied Telesis without a RMA number will be returned to the sender at the sender's expense.

To obtain a RMA number, contact Allied Telesis's Technical Support at our web site: **www.alliedtelesiselesis.com**.

For Sales or Corporate Information You can contact Allied Telesis for sales or corporate information at our web site: **www.alliedtelesis.com**. To find the contact information for your country, select Contact Us -> Worldwide Contacts.

Management Software Updates You can download new releases of management software for our managed products from either of the following Internet sites:

- Allied Telesis web site: **www.alliedtelesis.com**
- Allied Telesis FTP server: **ftp://ftp.alliedtelesis.com**

To download new software from the Allied Telesis FTP server using your workstation's command prompt, you need FTP client software and you must log in to the server. Enter "anonymous" as the user name and your email address for the password.

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Section 1. Getting Started

This section provides an introduction to the Web Browser Interface, and includes the following topics:

- Starting the Application
- User Interface Components
- Resetting the Device
- Starting the Application

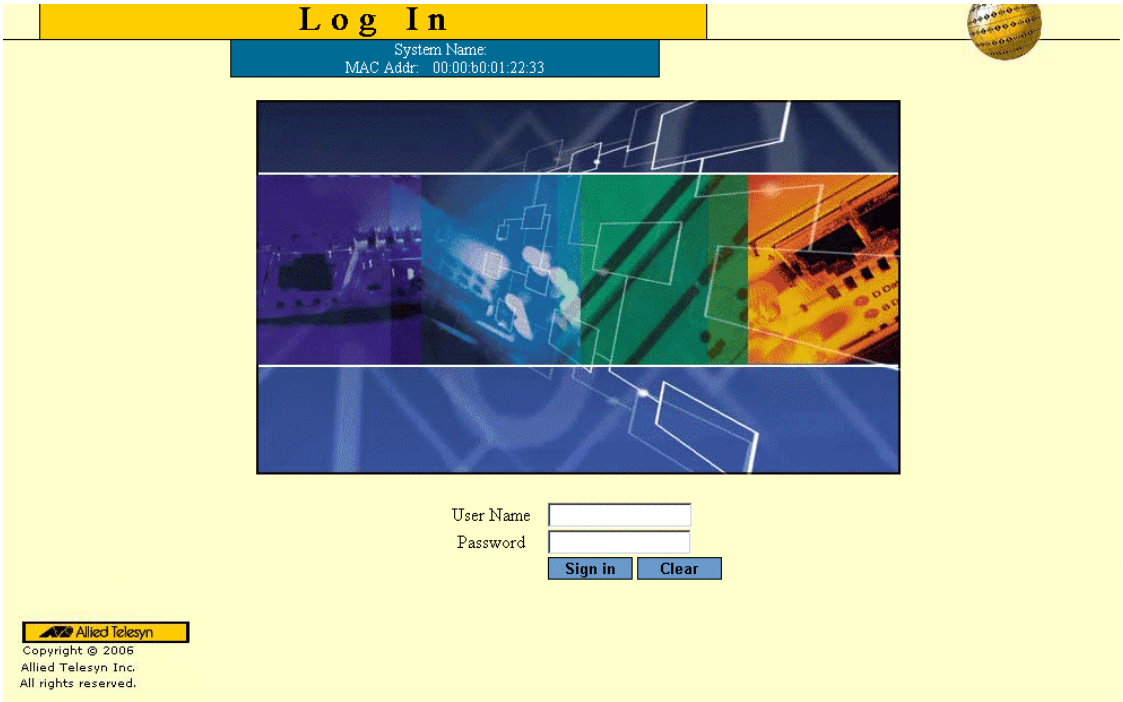
Starting the Application

This section contains information for starting the application. The login information is configured with a default user name and password. The default password is *friend*; the default user name is *manager*. Passwords are both case sensitive and alphanumeric. Additional user names can be added.

To open the application:

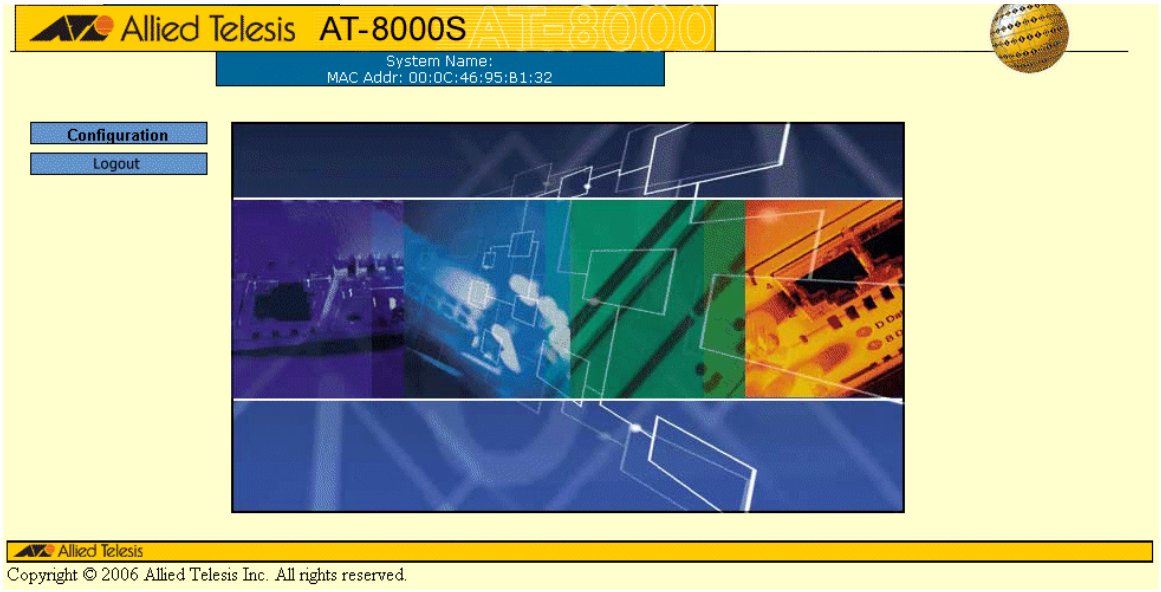
1. Open a web browser.
2. Enter the device IP address in the address bar and press <**Enter>**. The *Login Page* opens:

Figure 1: Login Page



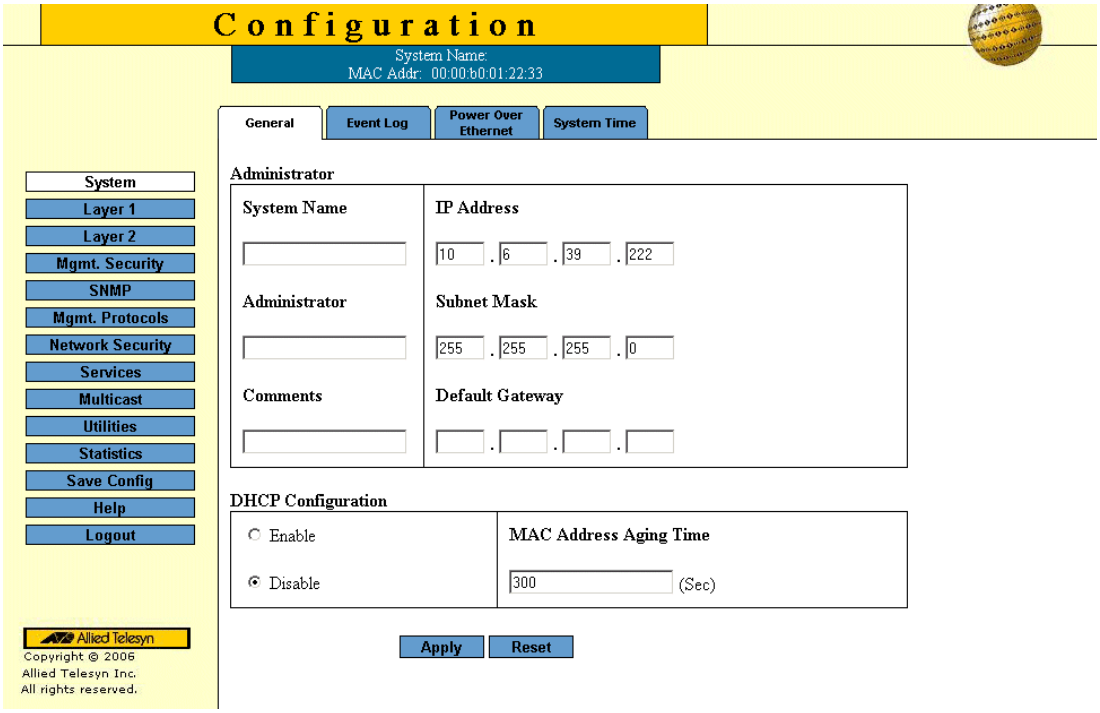
3. Enter the user name and password.
4. Click **Login**. The *Embedded Web System Home Page* opens:

Figure 2: Embedded Web System Home Page



5. Click **Configuration**. The *System General Page* opens:

Figure 3: System General Page



Using the Web Browser Interface

This section provides general information about the interface, and describes the following topics:

- Viewing the Device Representation
- User Interface Components
- Using the Management Buttons
- Using the Management Buttons
- Adding, Modifying and Deleting Information

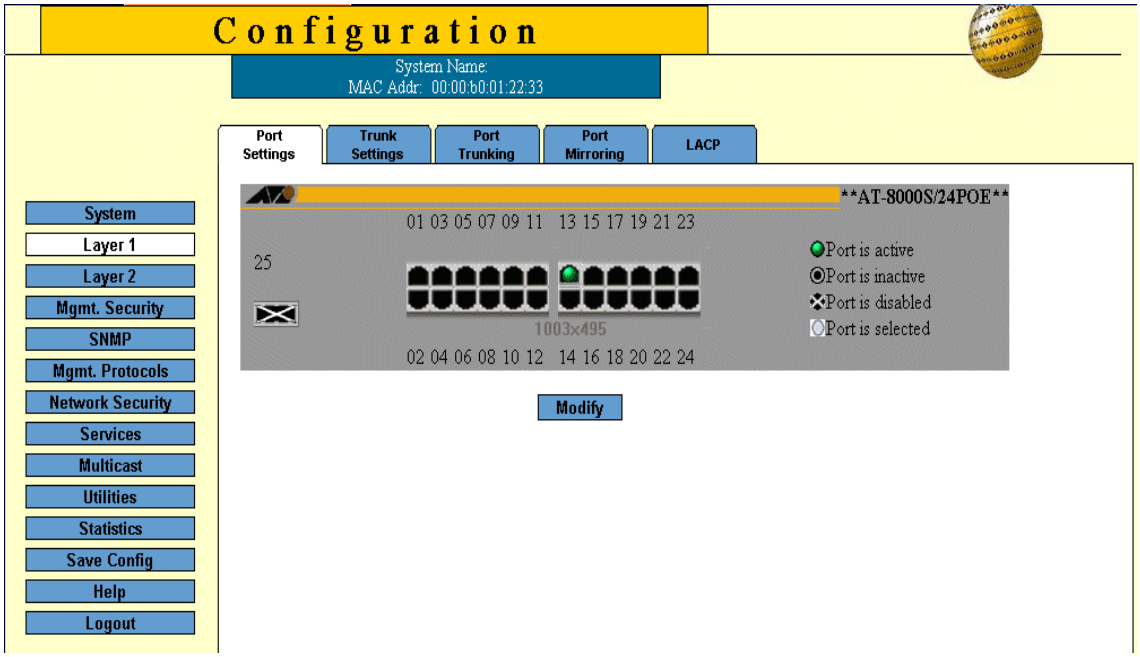
Viewing the Device Representation

Zoom Views provide a graphical representation of the device ports. The *Port Settings Page* displays an example of the Zoom View with a detailed graphical representation of the device ports.

To open a zoom view of device ports:

- Click **Layer 1 > Port Settings**. The *Port Settings Page* opens:

Figure 4: Port Settings Page

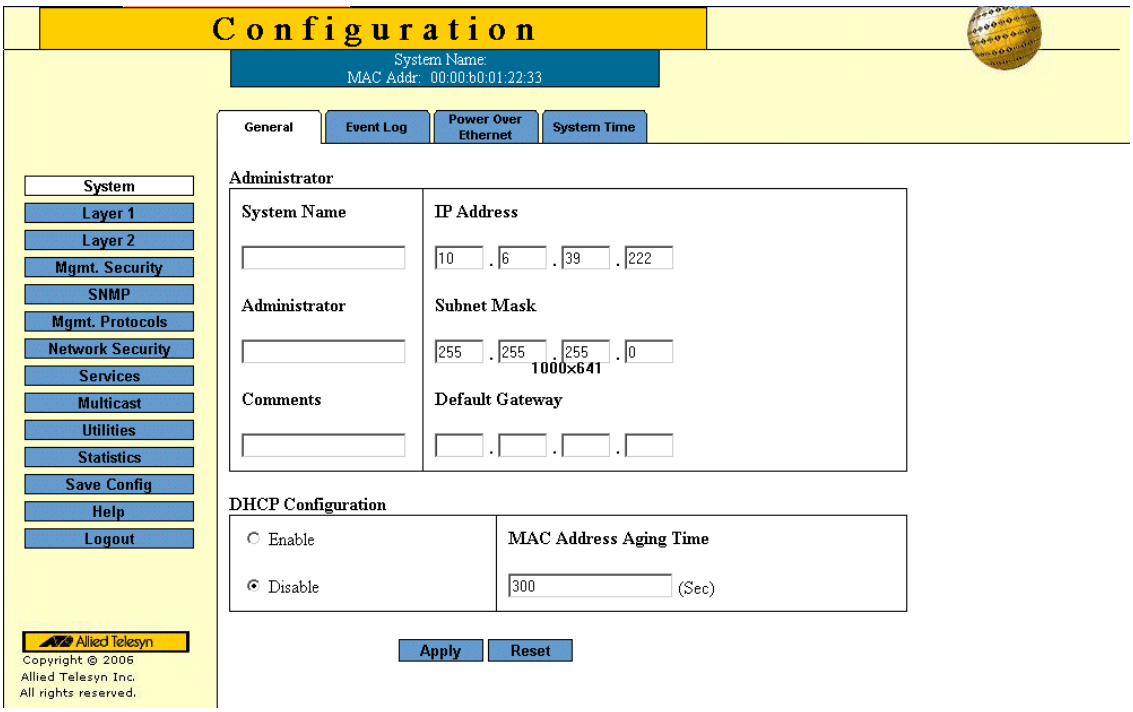


The port status indicators vary with context, for example the general port status indicators are as in the figure above while port mirror indicators are different. Indicator legend descriptions are provided with each context of the specific Zoom View.

User Interface Components

The *System General Page* example shows the interface components.

Figure 5: System General Page



The following table lists the interface components with their corresponding numbers:

Table 1: Interface Components

	Component	Description
1	Menu	The Menu provides easy navigation through the main management software features. In addition, the Menu provides general navigation options.
2	Tabs	Provide navigation to configurable device sub-features.
3	Management Buttons	Enable configuring parameters and navigation to other pages, see *Using the Management Buttons.*

Using the Management Buttons

Management buttons provide an easy method of configuring device information, and include the following:

Table 2: Configuration Management Buttons

Button	Button Name	Description
Add	Add	Opens a page which creates new configuration entries.
Create	Create	Opens a page which creates new configuration entries.
Modify	Modify	Modifies the configuration settings. The configuration change is saved to the Running Configuration file and is maintained until reset or power-up.
Apply	Apply	Saves configuration changes to the device. The configuration change is saved to the Running Configuration file and is maintained until reset or power-up.
Configure	Configure	Opens a page which creates or modifies configuration entries.
Delete	Delete	Deletes the selected table and configuration entries.
View	View	Displays detailed information for the current page/configuration.
Refresh	Refresh	Refreshes information displayed on the current page.
Reset	Reset	Device reset. Resets the device information for all device parameters according to current configuration.
Defaults	Defaults	Configuration reset. Resets the information for all parameters in the current context (page/tab) to predefined defaults.
Test	Test	Performs a diagnostic test.
Clear All Counters	Clear All Counters	Removes all counters.
The application menu includes the following general purpose buttons:		
Configuration	Configuration	Opens the default configuration page (*System General*).
Login	Login	Signs the user into the WBI, starts the management session.
Logout	Logout	Signs the user out of the WBI, ending the management session.
Help	Help	Opens the online help page.
Exit Help	Exit Help	Closes the online help page.
Save Config	Save Config	Used when configuration changes to the device need to be saved as permanent. The configuration is saved as permanent by copying the current Running Configuration file to the Startup Configuration file.

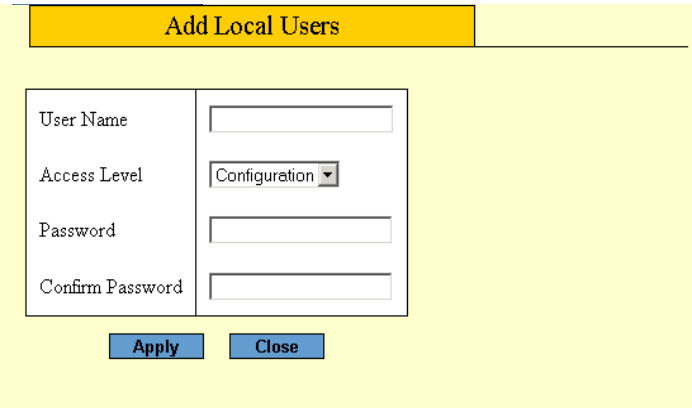
Adding, Modifying and Deleting Information

The WBI contains and tables for configuring devices. User-defined information can be added, modified or deleted in specific WBI pages.

To add information to tables or WBI pages:

1. Open a WBI page.
2. Click **Add**. An *Add* page opens, for example, the *Add Local User Page*:

Figure 6: Add Local User Page

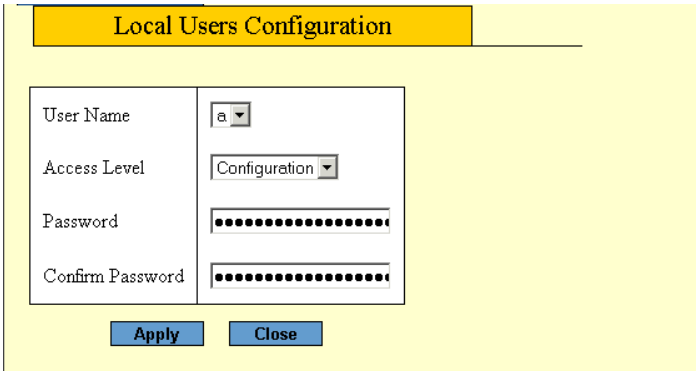


3. Define the fields.
4. Click **Apply**. The configuration information is saved, and the device is updated.

To modify information in tables or WBI pages:

1. Open a WBI page.
2. Select a table entry.
3. Click **Modify**. A Modify (or Settings) page opens, for example, the *Local User Settings Page*:

Figure 7: Local User Settings Page



4. Define the fields.
5. Click **Apply**. The fields are modified, and the information is saved to the device.

To delete information in tables or WBI pages:

1. Open the WBI page.
2. Select a table row.
3. Click **Delete**. The information is deleted, and the device is updated.

Saving Configurations

User-defined information can be saved for permanent use or until next update, not just for the current session. A configuration is saved as permanent by copying the current Running Configuration file to the Startup Configuration file.

To save changes permanently:

- Click **Save Config** on the menu.

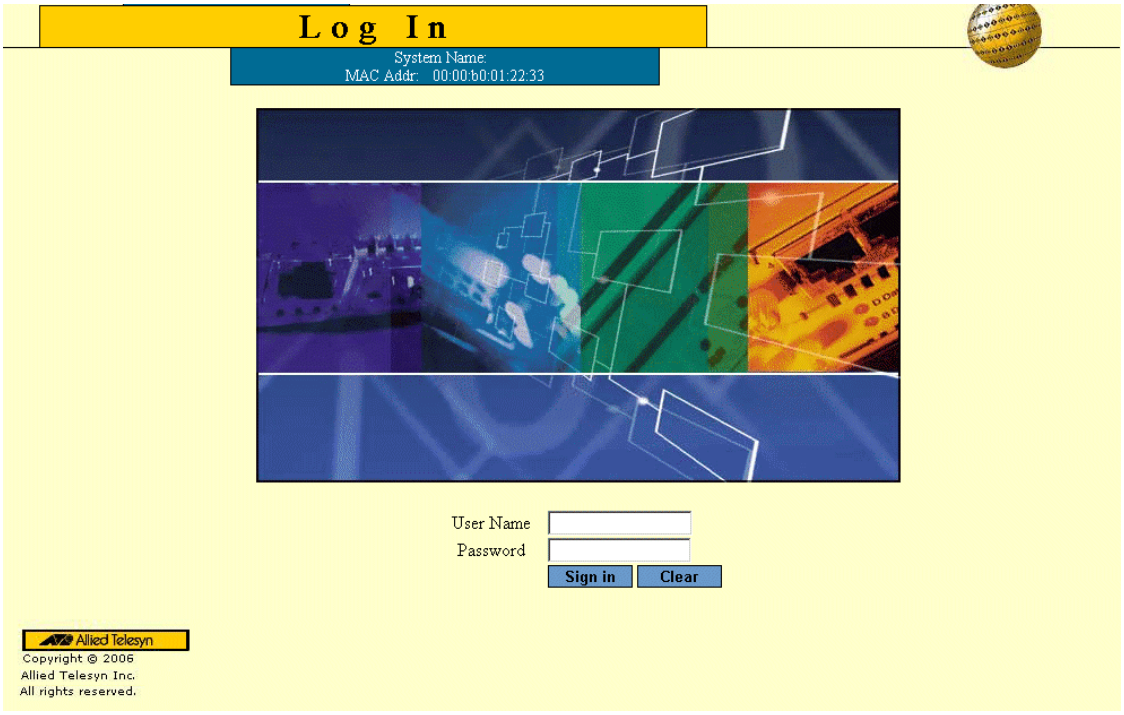
Logging Out

The Logout option enables the user to log out of the device thereby terminating the running session.

To log out:

- In any page, click **Logout** on the menu. The current management session is ended and the *Login Page* opens:

Figure 8: Login Page



For more information about login, refer to *Starting the Application*.

Resetting the Device

The Reset option enables resetting the device from a remote location.

Note

Save all changes to the Running Configuration file before resetting the device. This prevents the current device configuration from being lost. See also *"Managing System Files"*.

To reset the device:

1. In the *System General Page*, click **Reset**. You are prompted to confirm.
2. Click **OK**. The device is reset. Resetting the device ends the web browser management session. You must restart the session to continue managing the device. After the device is reset, a prompt for a user name and password displays.
3. Enter a user name and password to reconnect to the Web Interface.

To reset the device to the predefined default configuration:

- In the System General Page, click **Defaults**. The default settings are restored and the device is reset.

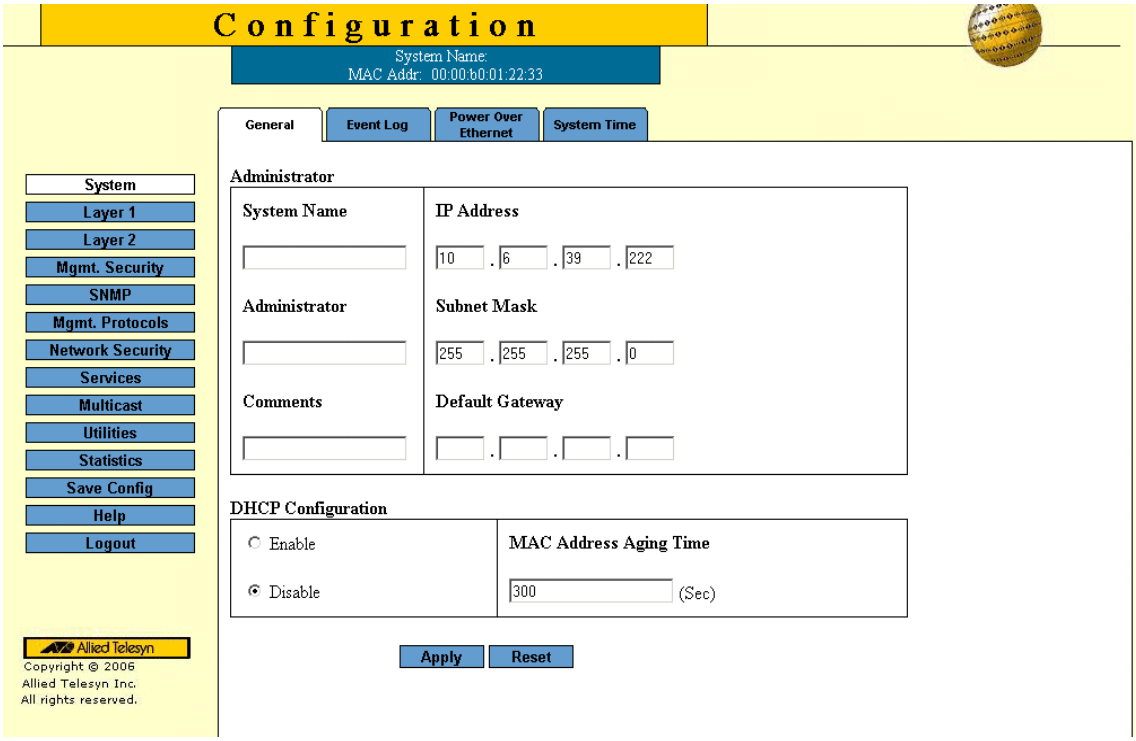
Section 2. Defining System Information

The *System General Page* contains general device information, including system name and its IP addressing, administrator and passwords information, *Dynamic Host Configuration Protocol* (DHCP) configuration and MAC Address Aging Time.

To define the general system information:

1. Click **System > General**. The *System General Page* opens:

Figure 9: System General Page



The *System General Page* comprises two sections: *Administration* and *DHCP Configuration*.

The *Administration* section of the *System General Page* contains the following fields:

- **System Name** — Indicates the user-defined name of the device. This is a required field. The field range is 0-159 characters.
- **Administrator** — Indicates the name of the administrator responsible for managing the device. The field range is 0-159 characters.
- **Comments** — (Optional) The user can add any comments about the device in this field, for example, fill in the location of the device.
- **IP Address** — Indicates the device's IP address.
- **Subnet Mask** — Indicates the device's subnet mask.

- **Default Gateway** — The IP address of a router for remote management of the device. The address must be entered in the format: xxx.xxx.xxx.xxx. The default value is 0.0.0.0.

Note

Packets are forwarded to the default IP when frames are sent to a remote network via the default gateway. The configured IP address must belong to the same subnet as one of the IP interfaces.

The *DHCP Configuration* section of the *System General Page* contains the following fields:

- **DHCP** — Indicates if the *Dynamic Host Configuration Protocol* (DHCP) is enabled.
  - *Enable* — DHCP dynamically assigns IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. If the DHCP client software is activated, the device immediately begins to query the network for a DHCP server. The device continues to query the network for its IP configuration until it receives a response. If the device and IP address are manually assigned, that address is deleted and replaced by the IP address received from the DHCP server.
  - *Disable* — Disables DHCP on the device.
- **Mac Address Aging Time** — The time interval an inactive dynamic MAC address can remain in the MAC address table before it is deleted. The default time is 300 seconds, and the range is 0-300.

2. Define the administration, passwords and DHCP configuration fields.
3. Click **Apply**. The system general information is defined and the device is updated.
4. Click **Save Config** on the menu to save the changes permanently.

Section 3. Configuring System Time

This section provides information for configuring system time parameters, including:

- Setting the System Clock
- Configuring SNTP
- Configuring Daylight Saving Time

The following is a list of Daylight Savings Time start and end dates by country:

- **Albania** — From the last weekend of March until the last weekend of October.
- **Australia** — From the end of October until the end of March.
- **Australia - Tasmania** — From the beginning of October until the end of March.
- **Armenia** — From the last weekend of March until the last weekend of October.
- **Austria** — From the last weekend of March until the last weekend of October.
- **Bahamas** — From April to October, in conjunction with Daylight Savings Time in the United States.
- **Belarus** — From the last weekend of March until the last weekend of October.
- **Belgium** — From the last weekend of March until the last weekend of October.
- **Brazil** — From the third Sunday in October until the third Saturday in March. During the period of Daylight Saving Time, Brazilian clocks go forward one hour in most of the Brazilian southeast.
- **Chile** — In Easter Island, from March 9 until October 12. In the rest of the country, from the first Sunday in March or after 9th March.
- **China** — China does not use Daylight Saving Time.
- **Canada** — From the first Sunday in April until the last Sunday of October. Daylight Saving Time is usually regulated by provincial and territorial governments. Exceptions may exist in certain municipalities.
- **Cuba** — From the last Sunday of March to the last Sunday of October.
- **Cyprus** — From the last weekend of March until the last weekend of October.
- **Denmark** — From the last weekend of March until the last weekend of October.
- **Egypt** — From the last Friday in April until the last Thursday in September.
- **Estonia** — From the last weekend of March until the last weekend of October.
- **Finland** — From the last weekend of March until the last weekend of October.
- **France** — From the last weekend of March until the last weekend of October.
- **Germany** — From the last weekend of March until the last weekend of October.
- **Greece** — From the last weekend of March until the last weekend of October.
- **Hungary** — From the last weekend of March until the last weekend of October.
- **India** — India does not use Daylight Saving Time.
- **Iran** — From Farvardin 1 until Mehr 1.
- **Iraq** — From April 1 until October 1.
- **Ireland** — From the last weekend of March until the last weekend of October.
- **Israel** — Varies year-to-year.
- **Italy** — From the last weekend of March until the last weekend of October.
- **Japan** — Japan does not use Daylight Saving Time.
- **Jordan** — From the last weekend of March until the last weekend of October.
- **Latvia** — From the last weekend of March until the last weekend of October.
- **Lebanon** — From the last weekend of March until the last weekend of October.

- **Lithuania** — From the last weekend of March until the last weekend of October.
- **Luxembourg** — From the last weekend of March until the last weekend of October.
- **Macedonia** — From the last weekend of March until the last weekend of October.
- **Mexico** — From the first Sunday in April at 02:00 to the last Sunday in October at 02:00.
- **Moldova** — From the last weekend of March until the last weekend of October.
- **Montenegro** — From the last weekend of March until the last weekend of October.
- **Netherlands** — From the last weekend of March until the last weekend of October.
- **New Zealand** — From the first Sunday in October until the first Sunday on or after March 15.
- **Norway** — From the last weekend of March until the last weekend of October.
- **Paraguay** — From April 6 until September 7.
- **Poland** — From the last weekend of March until the last weekend of October.
- **Portugal** — From the last weekend of March until the last weekend of October.
- **Romania** — From the last weekend of March until the last weekend of October.
- **Russia** — From the last weekend of March until the last weekend of October.
- **Serbia** — From the last weekend of March until the last weekend of October.
- **Slovak Republic** - From the last weekend of March until the last weekend of October.
- **South Africa** — South Africa does not use Daylight Saving Time.
- **Spain** — From the last weekend of March until the last weekend of October.
- **Sweden** — From the last weekend of March until the last weekend of October.
- **Switzerland** — From the last weekend of March until the last weekend of October.
- **Syria** — From March 31 until October 30.
- **Taiwan** — Taiwan does not use Daylight Saving Time.
- **Turkey** — From the last weekend of March until the last weekend of October.
- **United Kingdom** — From the last weekend of March until the last weekend of October.
- **United States of America** — From the first Sunday in April at 02:00 to the last Sunday in October at 02:00.

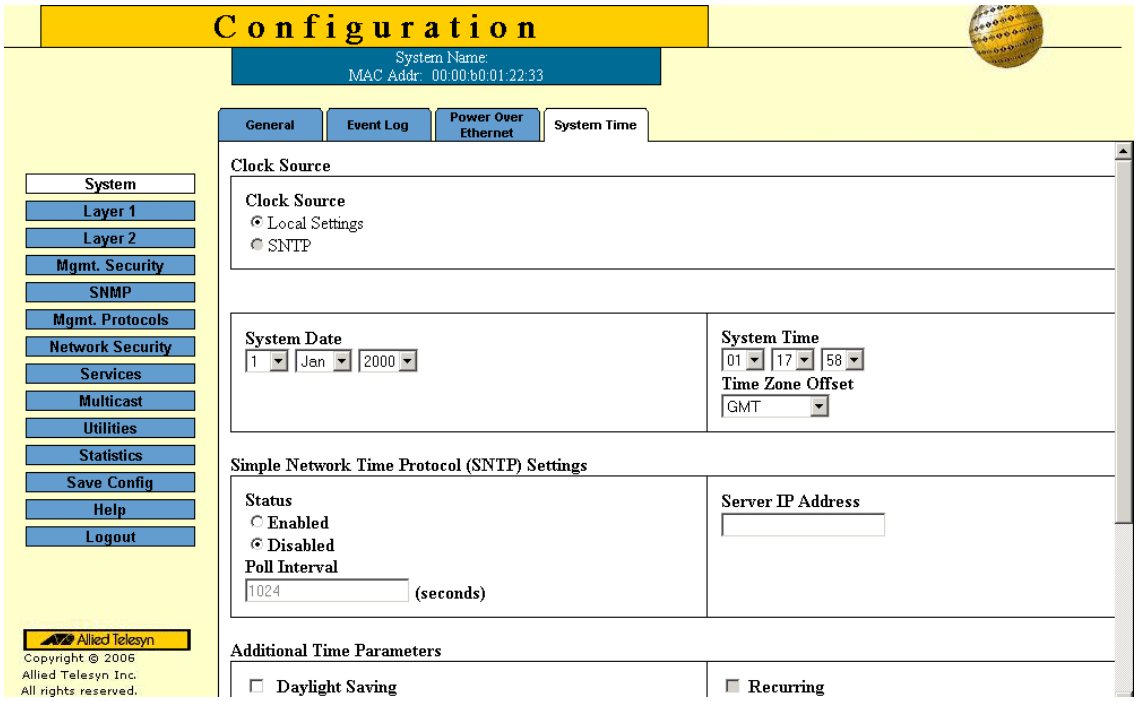
Setting the System Clock

The *System Time Page* contains fields for defining system time parameters for both the local hardware clock and the external SNTP clock. If the system time is kept using an external SNTP clock, and the external SNTP clock fails, the system time reverts to the local hardware clock. Daylight Savings Time can be enabled on the device.

To configure the system clock time:

1. Click **System > System Time**. The *System Time Page* opens:

Figure 10: System Time Page



The *Clock Source* and *System Time* sections of the *System Time Page* contains the following fields:

- **Clock Source** — The source used to set the system clock. The possible field values are:
  - *Use Local Settings* — Indicates that the clock is set locally.
  - *Use SNTP Server* — Indicates that the system time is set via an SNTP server.
- **System Time** — Sets the local clock time. The field format is HH:MM:SS. For example: 21:15:03.
- **System Date** — Sets the system date. The field format is Day/Month/Year. For example: 04/May/50 (May 4, 2050).
- **Time Zone Offset** — The difference between Greenwich Mean Time (GMT) and local time. For example, the Time Zone Offset for Paris is GMT +1, while the Time Zone Offset for New York is GMT –5.

To set the system clock:

2. Select the system time mode.
3. Define the *System Date*, *System Time and Time Zone Offset* fields.
4. Click **Apply** in each section. The local system clock settings are saved, and the device is updated.
5. Click **Save Config** on the menu to save the changes permanently.

Configuring SNTP

The device supports the *Simple Network Time Protocol* (SNTP). SNTP assures accurate network device clock time synchronization up to the millisecond. Time synchronization is performed by a network SNTP server. The device operates only as an SNTP client, and cannot provide time services to other systems. The device can poll the following server types for the server time:

- Unicast
- Anycast
- Broadcast

Time sources are established by stratums. Stratums define the accuracy of the reference clock. The higher the stratum (where zero is the highest), the more accurate the clock. The device receives time from stratum 1 and above. The following is an example of stratums:

Stratum 0 — A real time clock (such as a GPS system) is used as the time source.

Stratum 1 — A server that is directly linked to a Stratum 0 time source is used. Stratum 1 time servers provide primary network time standards.

Stratum 2 — The time source is distanced from the Stratum 1 server over a network path. For example, a Stratum 2 server receives the time over a network link, via NTP, from a Stratum 1 server.

Polling for Unicast Time Information

Polling for Unicast information is used for polling a server for which the IP address is known. T1 - T4 are used to determine the server time. This is the preferred method for synchronizing device time.

Polling for Anycast Time Information

Polling for Anycast information is used when the SNTP server IP address is unknown. The first Anycast server to return a response is used to set the time value. Time levels T3 and T4 are used to determine the server time. Using Anycast time information for synchronizing device time is preferred to using Broadcast time information.

Broadcast Time Information

Broadcast information is used when the server IP address is unknown. When a broadcast message is sent from an SNTP server, the SNTP client listens for the response. The SNTP client neither sends time information requests nor receives responses from the Broadcast server.

Message Digest 5 (MD5) Authentication safeguards device synchronization paths to SNTP servers. MD5 is an algorithm that produces a 128-bit hash. MD5 is a variation of MD4, and increases MD4 security. MD5 verifies the integrity of the communication, authenticates the origin of the communication.

To define SNTP global parameters:

1. Click **System > System Time**. The *System Time Page* opens.
   The *SNTP Settings* section of the *System Time Page* contains the following fields:

- **Status** — Indicates if SNTP is enabled on the device. The possible field values are:
  - *Disabled* — Indicates that SNTP is disabled.
  - *Enabled* — Indicates that SNTP is enabled.
- **Server IP Address** — Displays a user-defined SNTP server IP address.
- **Poll Interval** — Defines the interval (in seconds) at which the SNTP server is polled for Unicast information. The Poll Interval default is 1024 seconds.

2. Select the SNTP *Status.*

3. Define the *Server IP Address* and the *Poll Interval* fields.
4. Click **Apply**. The SNTP global settings are defined, and the device is updated.
5. Click **Save Config** on the menu to save the changes permanently.

Configuring Daylight Saving Time

To configure DST:

1. Click **System > System Time**. The *System Time Page* opens:
   The *Additional Time Parameters* section of the *System Time Page* contains the following fields:

- **Daylight Saving** — Enables automatic Daylight Saving Time (DST) on the device based on the device's location. There are two types of daylight settings, either by a specific date in a particular year or a recurring setting irrespective of the year. For a specific setting in a particular year complete the *Daylight Savings* area, and for a recurring setting, complete the *Recurring* area. The possible field values are:
  - *USA* — The device devices to DST at 2:00 a.m. on the first Sunday of April, and reverts to standard time at 2:00 a.m. on the last Sunday of October.
  - *European* — The device devices to DST at 1:00 am on the last Sunday in March and reverts to standard time at 1:00 am on the last Sunday in October. The *European* option applies to EU members, and other European countries using the EU standard.
  - *Custom* — The DST definitions are user-defined based on the device locality. If Custom is selected, the *From* and *To* fields must be defined.
- **Time Set Offset** — Used for non-USA and European countries to set the amount of time for DST (in minutes). The default time is 60 minutes. The range is 1-1440 minutes.
- **From** — Indicates the time that DST begins in countries other than the USA and Europe, in the format Day/Month/Year in one field and HH:MM in another. For example, if DST begins on October 25, 2007 at 5:00 am, the two fields should be set to 25/Oct./07 and 05:00. The possible field values are:
  - *Date* — The date on which DST begins. The possible field range is 1-31.
  - *Month* — The month of the year in which DST begins. The possible field range is Jan.-Dec.
  - *Year* — The year in which the configured DST begins.
  - *Time* — The time at which DST begins. The field format is HH:MM. For example: 05:30.
- **To** — Indicates the time that DST ends in countries other than the USA and Europe, in the format Day/Month/Year in one field and HH:MM in another. For example, if DST ends on March 23, 2008 at midnight, the two fields should be 23/Mar/08 and 00:00. The possible field values are:
  - *Date* — The date on which DST ends. The possible field range is 1-31.
  - *Month* — The month of the year in which DST ends. The possible field range is Jan-Dec.
  - *Year*— The year in which the configured DST ends.
  - *Time* — The time at which DST starts. The field format is HH:MM. For example: 05:30.
- **Recurring** — Enables user-defined DST for countries in which DST is constant from year to year, other than the USA and Europe.
- **From** — The time that DST begins each year. In the example, DST begins locally every first Sunday in April at midnight. The possible field values are:
  - *Day* — The day of the week from which DST begins every year. The possible field range is Sunday-Saturday.
  - *Week* — The week within the month from which DST begins every year. The possible field range is 1-5.
  - *Month* — The month of the year in which DST begins every year. The possible field range is Jan.-Dec.

  - *Time* — The time at which DST begins every year. The field format is Hour:Minute. For example: 02:10.

- **To** — The time that DST ends each year. In the example, DST ends locally every first Sunday in October at midnight. The possible field values are:
  - *Day* — The day of the week at which DST ends every year. The possible field range is Sunday-Saturday.
  - *Week* — The week within the month at which DST ends every year. The possible field range is 1-5.
  - *Month* — The month of the year in which DST ends every year. The possible field range is Jan.-Dec.
  - *Time* — The time at which DST ends every year. The field format is HH:MM. For example: 05:30.

2. To configure the device to automatically switch to DST, select *Daylight Savings* and select either *USA*, *European*, or *Other*. If you select *Other*, you must define its *From* and *To* fields. To configure DST parameters that will recur every year, select *Recurring* and define its *From* and *To* fields.
3. Click **Apply**. The DST settings are saved, and the device is updated.
4. Click **Save Config** on the menu to save the changes permanently.

Section 4. Configuring Device Security

This section describes setting security parameters for ports, device management methods, users, and servers. This section contains the following topics:

- Configuring Management Security
- Configuring Network Security

Configuring Management Security

This section provides information for configuring device management security: device authentication methods, users and passwords.

This section includes the following topics:

- Defining Access Profiles
- Defining Profile Rules
- Defining Authentication Profiles
- Mapping Authentication Profiles
- Configuring Server Based Authentication
- Configuring TACACS+
- Configuring RADIUS
- Configuring Local Users

Defining Access Profiles

Access profiles are profiles and rules for accessing the device. Access to management functions can be limited to user groups. User groups are defined for interfaces according to IP addresses or IP subnets. Access profiles contain management methods for accessing and managing the device. The device management methods include:

- All
- Telnet
- Secure Telnet (SSH)
- HTTP

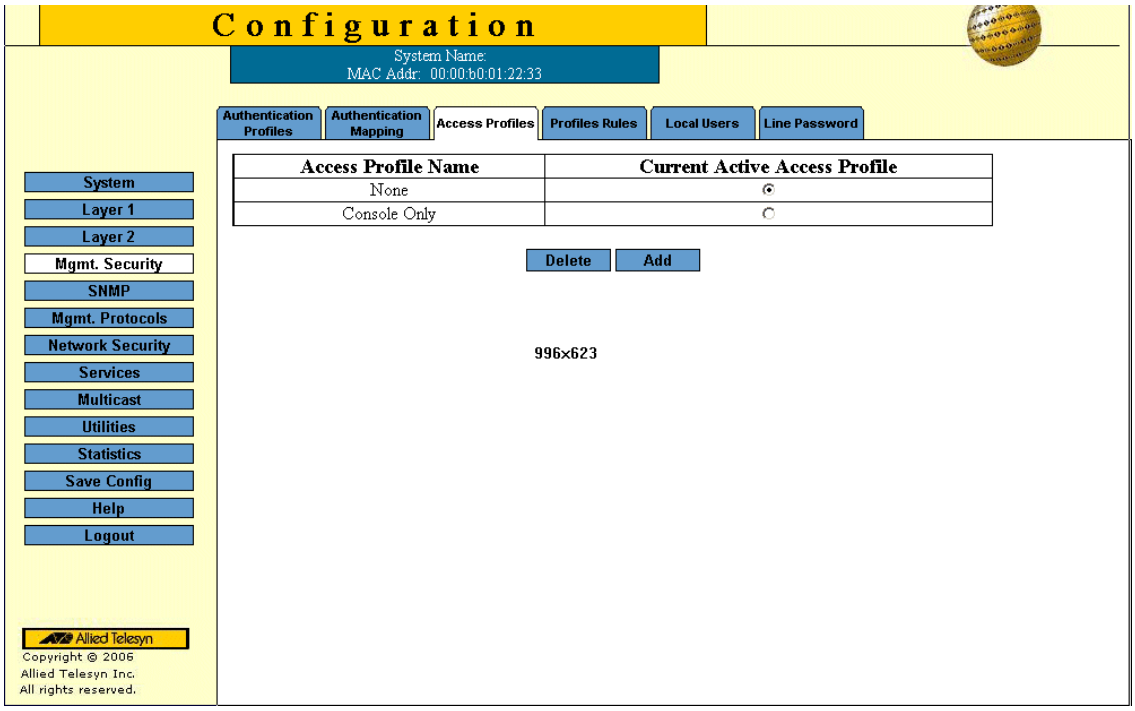
Management access to different management methods may differ between user groups. For example, User Group 1 can access the device module only via an HTTPS session, while User Group 2 can access the device module via both HTTPS and Telnet sessions. The *Access Profile Page* contains the currently configured access profiles and their activity status.

Assigning an access profile to an interface denies access via other interfaces. If an access profile is assigned to any interface, the device can be accessed by all interfaces.

To define access profiles:

1. Click **Mgmt. Security > Access Profile**. The *Access Profile Page* opens:

Figure 11: Access Profile Page



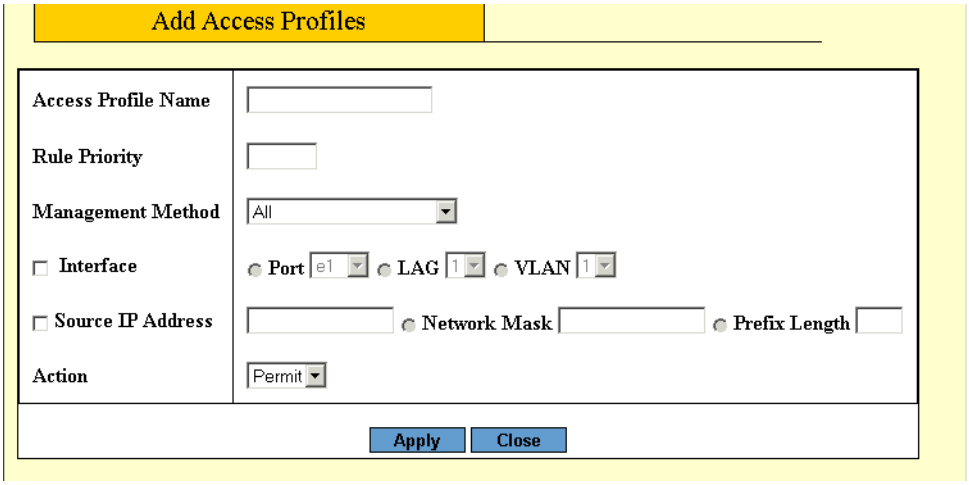
The *Access Profile Page* contains a table listing the currently defined profiles and their active status:

- **Access Profile Name** — The name of the profile. The access profile name can contain up to 32 characters.
- **Current Active Access Profile** — Indicates if the profile is currently active. The possible field values are:

- *Checked* — The access profile is currently active. Access Profiles cannot be deleted when active.
- *Unchecked* — Disables the active access profile.

2. Click **Add**. The *Add Access Profile Page* opens:

Figure 12: Add Access Profile Page



The *Add Access Profile Page* contains the following fields:

- **Access Profile Name** — Defines the name of a new access profile.
- **Rule Priority** — Defines the rule priority. When the packet is matched to a rule, user groups are either granted permission or denied device management access. The rule number is essential to matching packets to rules, as packets are matched on a first-fit basis. The rule priorities are assigned in the *Profile Rules Page*.
- **Management Method** — Defines the management method for which the rule is defined. Users with this access profile can access the device using the management method selected. The possible field values are:
  - *All* — Assigns all management methods to the rule.
  - *Telnet* — Assigns Telnet access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *Secure Telnet (SSH)* — Assigns SSH access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *HTTP* — Assigns HTTP access to the rule. If selected, users accessing the device using HTTP meeting access profile criteria are permitted or denied access to the device.
  - *Secure HTTP (HTTPS)* — Assigns HTTPS access to the rule. If selected, users accessing the device using HTTPS meeting access profile criteria are permitted or denied access to the device.
  - *SNMP* — Assigns SNMP access to the rule. If selected, users accessing the device using SNMP meeting access profile criteria are permitted or denied access to the device.
- **Interface** — Defines the interface on which the access profile is defined. The possible field values are:
  - *Port* — Specifies the port on which the access profile is defined.
  - *LAG* — Specifies the LAG on which the access profile is defined.
  - *VLAN* — Specifies the VLAN on which the access profile is defined.
- **Source IP Address** — Defines the interface source IP address to which the access profile applies. The *Source IP Address* field is valid for a subnetwork.

  - *Network Mask* — Defines the network mask of the source IP address.
  - *Prefix Length* — Defines the number of bits that comprise the source IP address prefix, or the network mask of the source IP address.

- **Action** — Defines the action attached to the access rule. The possible field values are:
  - *Permit* — Permits access to the device.
  - *Deny* — Denies access to the device. This is the default.

3. Define the fields.
4. Click **Apply**. The access profile is saved and the device is updated.
5. Click **Save Config** on the menu to save the changes permanently.

Defining Profile Rules

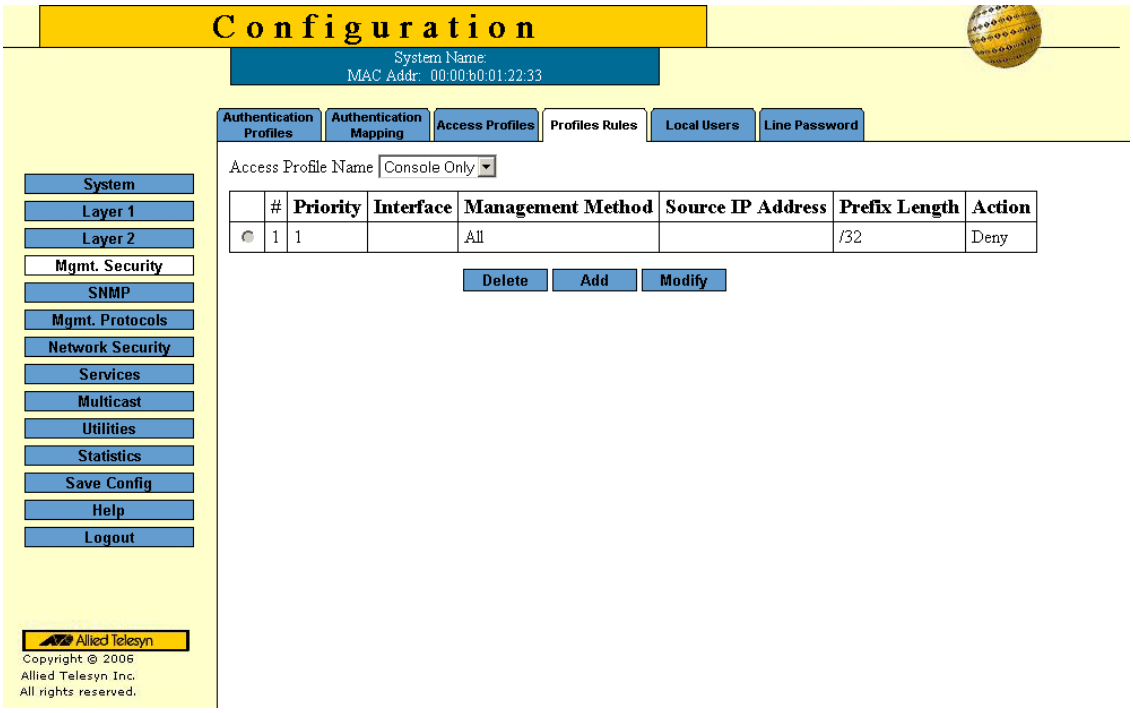
Access profiles can contain up to 128 rules that determine which users can manage the device module, and by which methods. Users can also be blocked from accessing the device. Rules are composed of filters including:

- Rule Priority
- Interface
- Management Method
- IP Address
- Prefix Length
- Forwarding Action

To define profile rules:

1. Click **Mgmt. Security > Profile Rules**: The *Profile Rules Page* opens:

Figure 13: Profile Rules Page

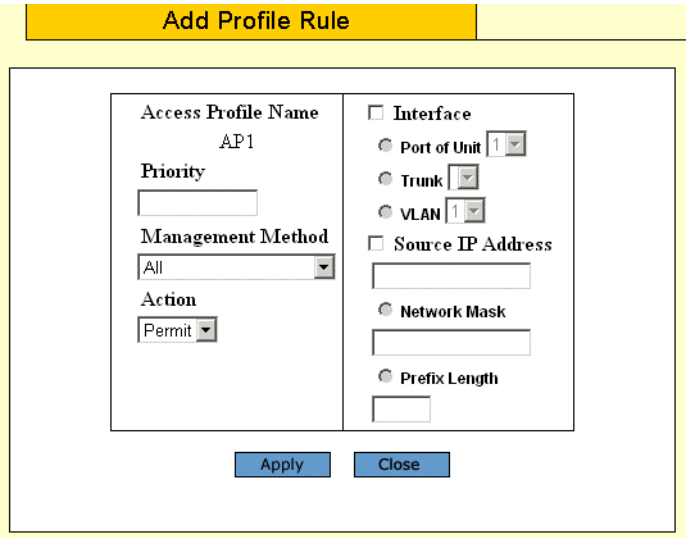


- **Access Profile Name** — Displays the access profile to which the rule is attached.
- **Priority** — Defines the rule priority. When the packet is matched to a rule, user groups are either granted permission or denied device management access. The rule number is essential to matching packets to rules, as packets are matched on a first-fit basis.
- **Interface** — Indicates the interface type to which the rule applies. The possible field values are:
  - *Port* — Attaches the rule to the selected port.
  - *LAG* — Attaches the rule to the selected LAG.
  - *VLAN* — Attaches the rule to the selected VLAN.

- **Management Method** — Defines the management method for which the rule is defined. Users with this access profile can access the device using the management method selected. The possible field values are:
  - *All* — Assigns all management methods to the rule.
  - *Telnet* — Assigns Telnet access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *Secure Telnet (SSH)* — Assigns SSH access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *HTTP* — Assigns HTTP access to the rule. If selected, users accessing the device using HTTP meeting access profile criteria are permitted or denied access to the device.
  - *Secure HTTP (HTTPS)* — Assigns HTTPS access to the rule. If selected, users accessing the device using HTTPS meeting access profile criteria are permitted or denied access to the device.
  - *SNMP* — Assigns SNMP access to the rule. If selected, users accessing the device using SNMP meeting access profile criteria are permitted or denied access to the device.
- **Source IP Address** — Defines the interface source IP address to which the rule applies.
- **Prefix Length** — Defines the number of bits that comprise the source IP address prefix, or the network mask of the source IP address.
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Permit* — Permits access to the device.
  - *Deny* — Denies access to the device. This is the default.

2. Click **Add**. The *Add Profile Rule Page* opens:

Figure 14: Add Profile Rule Page

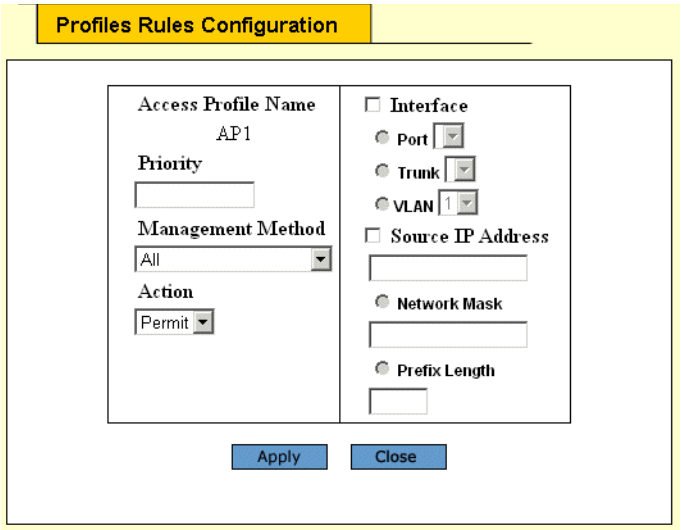


3. Define the fields.
4. Click **Apply**. The profile rule is added to the access profile, and the device is updated.
5. Click **Save Config** on the menu to save the changes permanently.

To modify an access rule:

1. Click **Mgmt. Security > Profile Rule**: The *Profile Rules Page* opens.
2. Click **Modify**. The *Profiles Rules Configuration Page* opens:

Figure 15: Profiles Rules Configuration Page



3. Define the fields.
4. Click **Apply**. The profile rule is saved, and the device is updated.

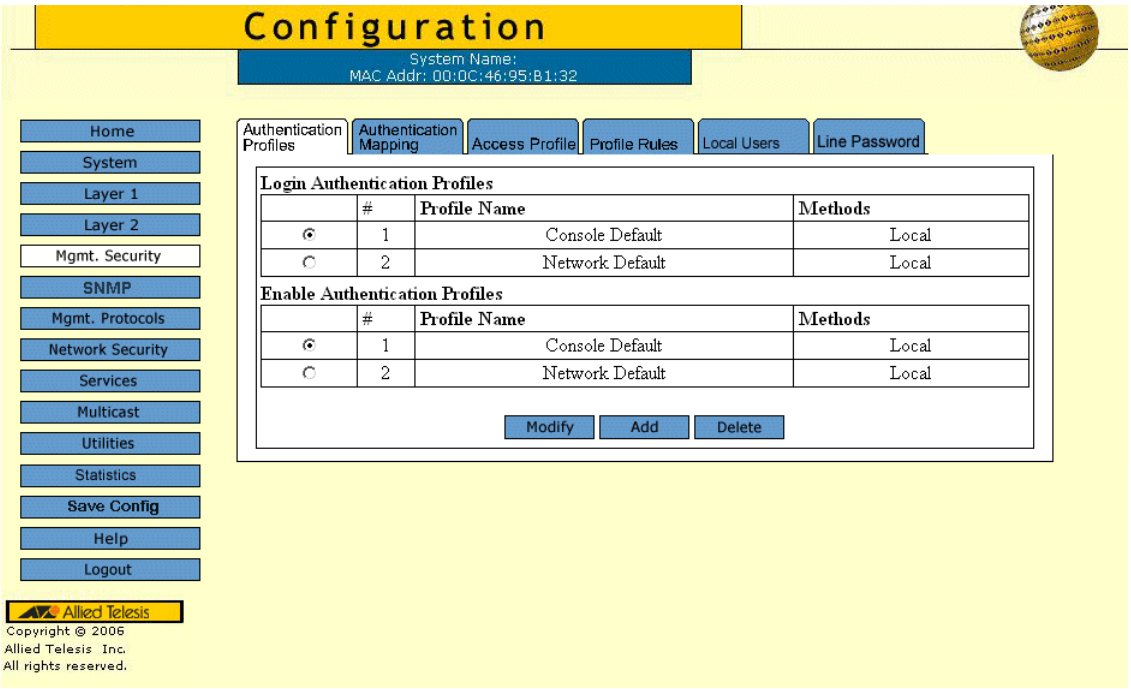
Defining Authentication Profiles

Authentication profiles allow network administrators to assign authentication methods for user authentication. User authentication can be performed either locally or on an external server. User authentication occurs in the order the methods are selected. If the first authentication method is not available, the next selected method is used. For example, if the selected authentication methods are RADIUS and Local, and the RADIUS server is not available, then the user is authenticated locally.

To define Authentication profiles:

1. Click **Mgmt. Security > Authentication Profiles**. The *Authentication Profiles Page* opens:

Figure 16: Authentication Profiles Page



The *Authentication Profiles Page* contains two tables which display the currently defined profiles:

- **Login Authentication Profiles** — Provides the method by which system users logon to the device.
- **Enable Authentication Profiles** — Provides user authentication levels for users accessing the device.

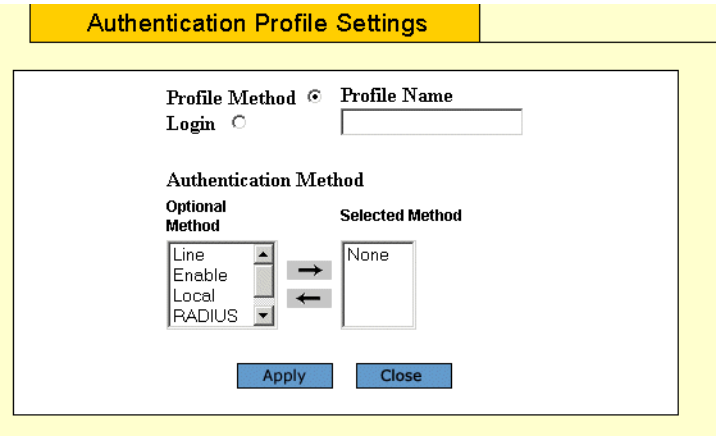
Each table contains the following fields:

- **Profile Name** — Contains a list of user-defined authentication profile lists to which user-defined authentication profiles are added. The default configuration displays as: *Console* Default, and Network Default.
- **Methods** — Indicates the authentication method for the selected authentication profile. The possible authentication methods are:
  - None — Assigns no authentication method to the authentication profile.
  - *Line* — Indicates that authentication uses a line password.
  - *Enable* — Indicates that authentication uses an Enable password.

- *Local* — Authenticates the user at the device level. The device checks the user name and password for authentication.
- *RADIUS* — Authenticates the user at the RADIUS server. For more information, see *Defining RADIUS Server Settings*.
- *TACACS+* — Authenticates the user at the TACACS+ server. For more information, see *Defining TACACS+ Host Settings*.
- *Local, RADIUS* — Indicates that authentication first occurs locally. If authentication cannot be verified locally, the RADIUS server authenticates the management method. If the RADIUS server cannot authenticate the management method, the session is blocked.
- *RADIUS, Local* — Indicates that authentication first occurs at the RADIUS server. If authentication cannot be verified at the RADIUS server, the session is authenticated locally. If the session cannot be authenticated locally, the session is blocked.
- *Local, RADIUS, None* — Indicates that authentication first occurs locally. If authentication cannot be verified locally, the RADIUS server authenticates the management method. If the RADIUS server cannot authenticate the management method, the session is permitted.
- *RADIUS, Local, None* — Indicates that Authentication first occurs at the RADIUS server. If authentication cannot be verified at the RADIUS server, the session is authenticated locally. If the session cannot be authenticated locally, the session is permitted.
- *Local, TACACS+* — Indicates that Authentication first occurs locally. If authentication cannot be verified locally, the TACACS+ server authenticates the management method. If the TACACS+ server cannot authenticate the management method, the session is blocked.
- *TACACS+, Local* — Indicates that authentication first occurs at the TACACS+ server. If authentication cannot be verified at the TACACS+ server, the session is authenticated locally. If the session cannot be authenticated locally, the session is blocked.
- *Local, TACACS+, None* — Indicates that authentication first occurs locally. If authentication cannot be verified locally, the TACACS+ server authenticates the management method. If the TACACS+ server cannot authenticate the management method, the session is permitted.
- *TACACS+, Local, None* — Indicates that authentication first occurs at the TACACS+ server. If authentication cannot be verified at the TACACS+ server, the session is authenticated locally. If the session cannot be authenticated locally, the session is permitted.

2. Click **Add**. The *Add Authentication Profile Page* opens:

Figure 17: Add Authentication Profile Page

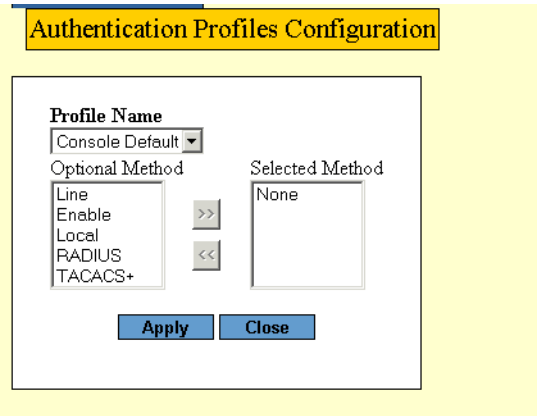


3. Select the type of function to configure for the profile: *Method* or *Login*.
4. Enter the *Profile Name.*
5. Using the arrows, move the method(s) from the *Optional Method* list to the *Selected Method* list.
6. Click **Apply**. The authentication profile is defined. The profile is added to the profiles table and the device is updated.

To modify the authentication profile settings:

1. Click **Mgmt. Security > Authentication Profiles**. The *Authentication Profiles Page* opens.
2. Click **Modify**. The *Authentication Profile Configuration Page* opens:

Figure 18: Authentication Profile Configuration Page



3. Select the *Profile Name* from the list.
4. Using the arrows, move the method(s) from the *Optional Method* list to the *Selected Method* list.
5. Click **Apply**. The profile settings are saved and the device is updated.

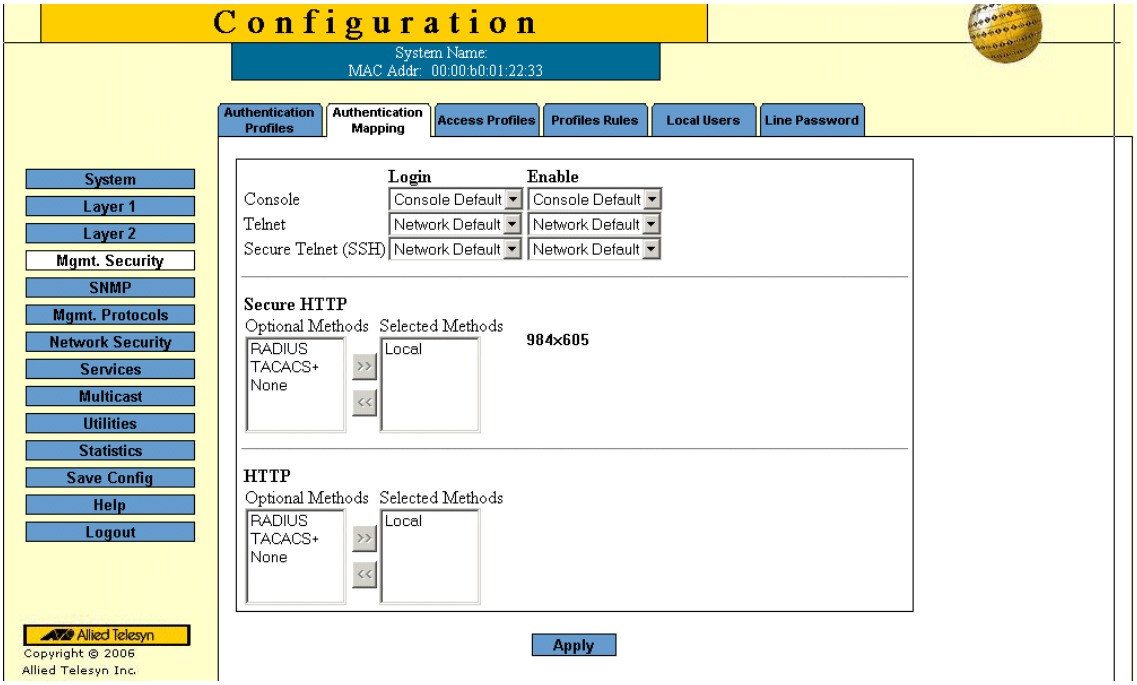
Mapping Authentication Profiles

After authentication profiles are defined, they can be applied to management access methods. For example, console users can be authenticated by Authentication Profile List 1, while Telnet users are authenticated by Authentication Profile List 2. Authentication methods are selected using arrows. The order in which the methods are selected is the order by which the authentication methods are used.

To map authentication methods:

1. Click **Mgmt. Security > Authentication Mapping**. The *Authentication Mapping Page* opens:

Figure 19: Authentication Mapping Page



The *Authentication Mapping Page* comprises three sections:

- Authentication Login and Enable
- Secure HTTP
- HTTP

The *Authentication Mapping Page* contains the following fields:

- **Console** — Indicates that authentication profiles are used to authenticate console users.
- **Telnet** — Indicates that authentication profiles are used to authenticate Telnet users.
- **Secure Telnet (SSH)**) — Indicates that authentication profiles are used to authenticate Secure Shell (SSH) users. SSH provides clients secure and encrypted remote connections to a device.
- **Secure HTTP** — Indicates that authentication methods are used for secure HTTP access. The possible methods are:
  - *Local* — Authentication occurs locally.
  - *RADIUS* — Authenticates the user at the RADIUS server.
  - TACACS+ — Authenticates the user at the TACACS+ server.

  - *None* — Indicates that no authentication method is used for access.
- **HTTP** — Indicates that authentication methods are used for HTTP access. Possible methods are:
  - *Local* — Authentication occurs locally.
  - *RADIUS* — Authenticates the user at the RADIUS server.
  - TACACS+ — Authenticates the user at the TACACS+ server.
  - *None* — Indicates that no authentication method is used for access.

2. Define the *Console*, *Telnet*, and *Secure Telnet (SSH)* fields.
3. Map the authentication method(s) in the *Secure HTTP* selection box using the >> arrow.
4. Map the authentication method(s) in the *HTTP* selection box.
5. Click **Save Config** on the menu to save the changes permanently.

Configuring Server Based Authentication

Network administrators assign authentication methods for user authentication. User authentication can be performed locally, or on an external server. User authentication occurs in the order the methods are selected. If the first authentication method is not available, the next selected method is used.

Configuring TACACS+

Terminal Access Controller Access Control System (TACACS+) provides centralized security user access validation. The system supports up-to 4 TACACS+ servers. TACACS+ provides a centralized user management system, while still retaining consistency with RADIUS and other authentication processes. TACACS+ provides the following services:

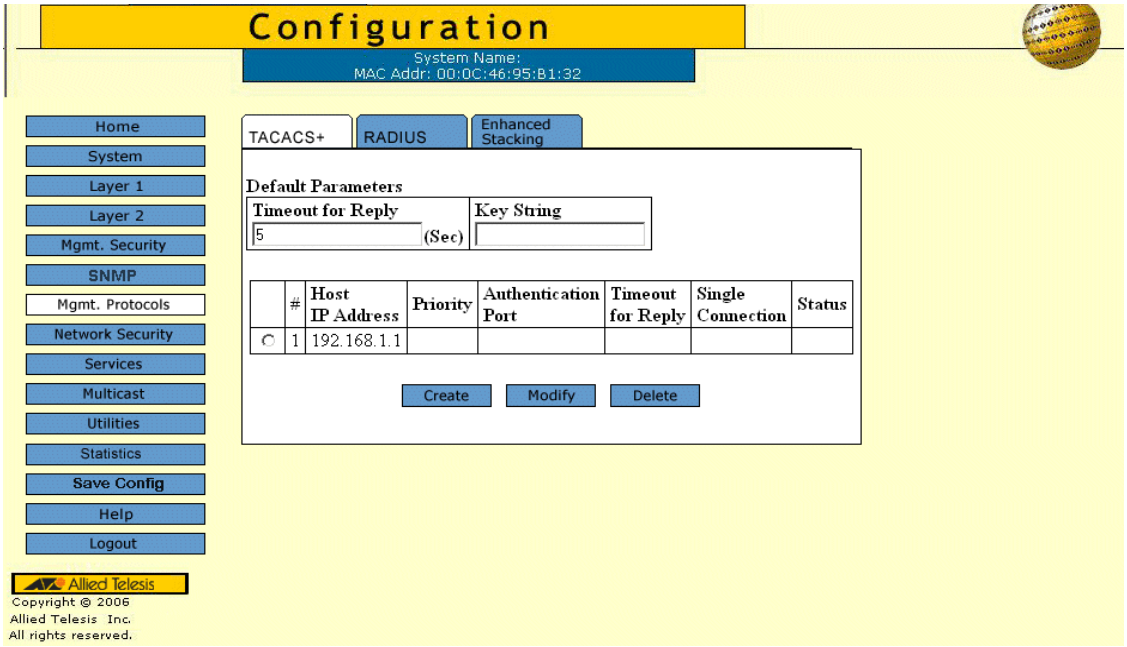
- **Authentication** — Performed at login and via user names and user-defined passwords.
- **Authorization** — Performed at login. Once the authentication session is completed, an authorization session starts using the authenticated user name.

The TACACS+ protocol ensures network integrity through encrypted protocol exchanges between the client and TACACS+ server.

To define TACACS+ security settings:

1. Click **Mgmt. Protocols > TACACS+**. The *TACACS+ Configuration Page* opens.

Figure 20: TACACS+ Configuration Page

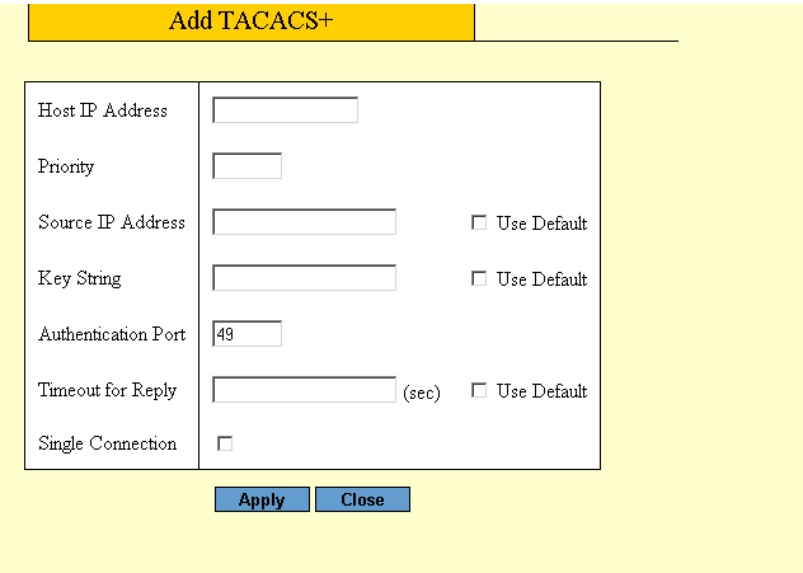


The *TACACS+ Configuration Page* contains the following fields:

- **Timeout for Reply** — Defines the time interval in seconds that passes before the connection between the device and the TACACS+ server times out. The field range is 1-60 seconds and the default is 10 seconds.
- **Key String** — Defines the default key string.
- **Server #** — Displays the server number.
- **Host IP Address** — Displays the TACACS+ server IP address.
- **Priority** — Defines the order in which the TACACS+ servers are used. The field range is 0-65535. The default is 0.
- **Authorization Port** — Identifies the authentication port. The authentication port is used to verify the TACACS+ server authentication.
- **Timeout for Reply** — Defines the time interval in seconds that passes before the connection between the device and the TACACS+ server times out. The field range is 1-60 seconds and the default is 10 seconds.
- **Single Connection** — Maintains a single open connection between the device and the TACACS+ server. The possible field values are:
  - *Checked* — Enables a single connection.
  - *Unchecked* — Disables a single connection.
- **Status** — Indicates the connection status between the device and the TACACS+ server. The possible field values are:
  - *Connected* — Indicates there is currently a connection between the device and the TACACS+ server.
  - *Not Connected* — Indicates there is not currently a connection between the device and the TACACS+ server.

2. Click **Create**. The *Add TACACS+ Page* opens.

Figure 21: Add TACACS+ Page



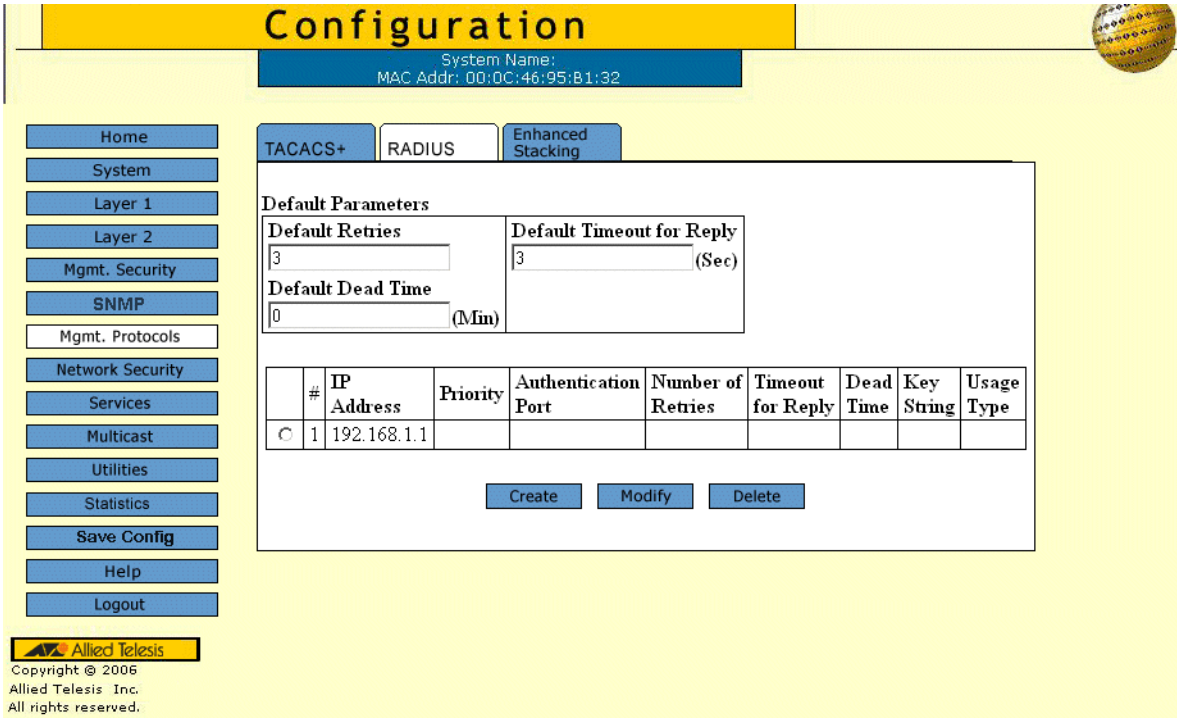
3. Define the fields.
4. Click **Apply**. The TACACS+ profile is saved, and the device is updated.

Configuring RADIUS

Remote Authorization Dial-In User Service (RADIUS) servers provide additional security for networks. RADIUS servers provide a centralized authentication method for web access. To configure RADIUS security settings:

1. Click **Mgmt. Protocols > RADIUS**. The *RADIUS Configuration Page* opens:

Figure 22: RADIUS Configuration Page



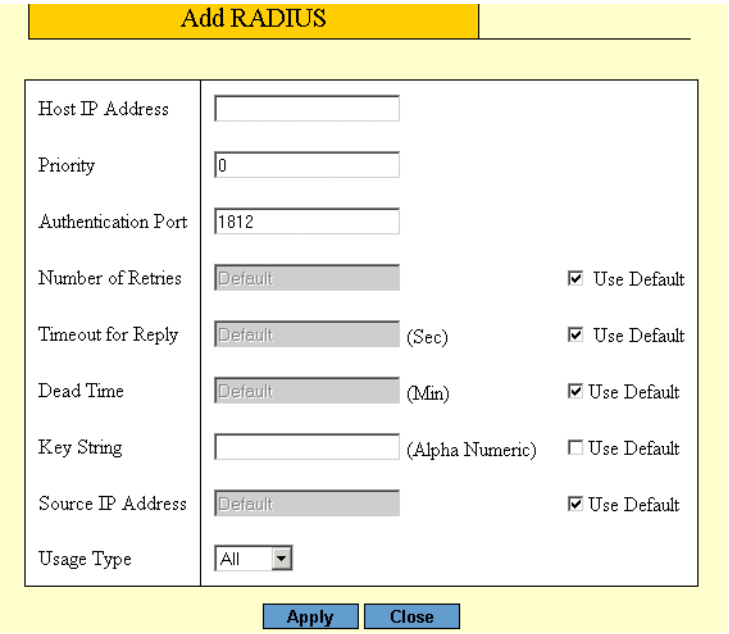
The *RADIUS Configuration Page* contains the following fields:

- **Default Retries** — Defines the default number of transmitted requests sent to the RADIUS server before a failure occurs. Possible field values are 1-10.
- **Default Timeout for Reply** — Defines the default time interval in seconds that passes before the connection between the device and the TACACS+ server times out. The field range is 1-60 seconds and the default is 10 seconds.
- **Default Dead Time** — Defines the default amount of time (in minutes) that a RADIUS server is bypassed for service requests. The range is 0-2000.
- **Server #** — Displays the RADIUS server number.
- **IP Address** — Displays the RADIUS server IP address.
- **Priority** — Displays the RADIUS server priority. The possible values are 1-65535, where 1 is the highest value. The RADIUS server priority is used to configure the server query order.
- **Authorization Port** — Identifies the authentication port. The authentication port is used to verify the RADIUS server authentication. The authenticated port default is 1812.
- **Number of Retries** — Defines the number of transmitted requests sent to the RADIUS server before a failure occurs. Possible field values are 1-10.

- **Timeout for Reply** — Defines the time interval in seconds that passes before the connection between the device and the RADUIUS server times out. The field range is 1-60 seconds and the default is 10 seconds.
- **Dead Time** — Defines the amount of time (in minutes) that a RADIUS server is bypassed for service requests. The range is 0-2000. The default is 0 minutes.
- **Key String** — Defines the default key string used for authenticating and encrypting all RADIUS-communications between the device and the RADIUS server. This key must match the RADIUS encryption.
- **Usage Type**— Specifies the RADIUS server authentication type. The default value is *All*. The possible field values are:
  - *Log in* — Indicates the RADIUS server is used for authenticating user name and passwords.
  - *802.1X* — Indicates the RADIUS server is used for 802.1X authentication.
  - *All* — Indicates the RADIUS server is used for authenticating user names and passwords, and 802.1X port authentication.

2. Click **Create**. The *Add RADIUS Page* opens.

Figure 23: Add RADIUS Page



3. Define the fields.
4. Click **Apply**. The RADIUS profile is saved, and the device is updated.

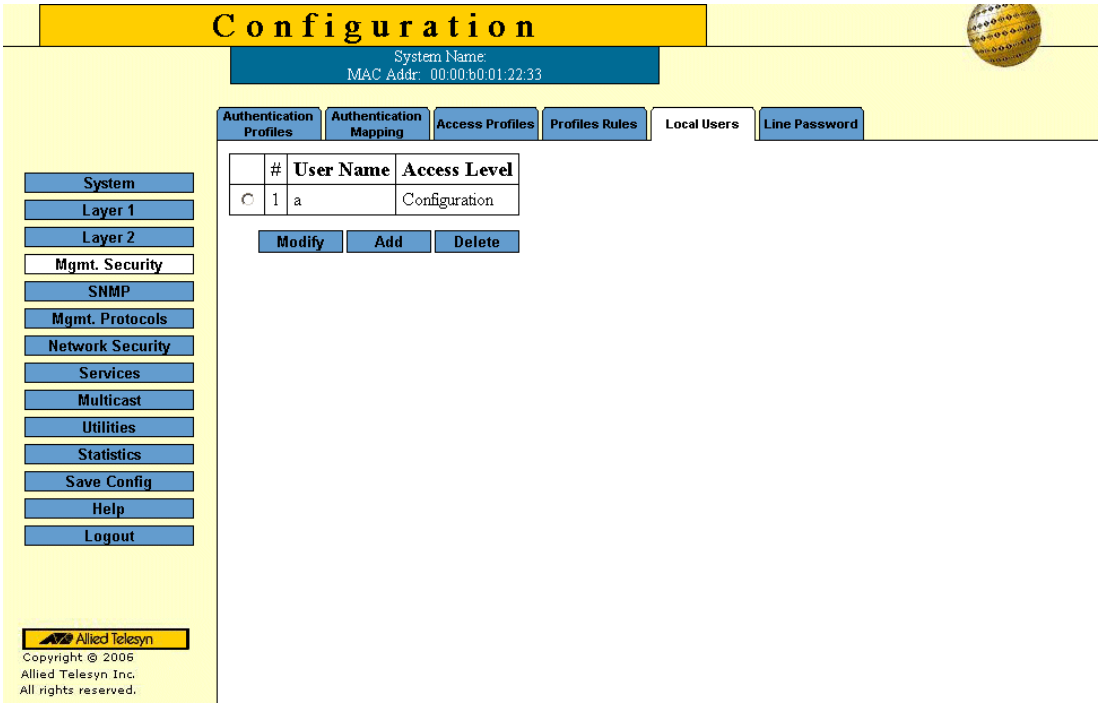
Configuring Local Users

Network administrators can define users, passwords, and access levels for users using the *Local Users Page*.

To configure local users and passwords:

1. Click **Mgmt. Security > Local Users**. The *Local Users Page* opens:

Figure 24: Local Users Page

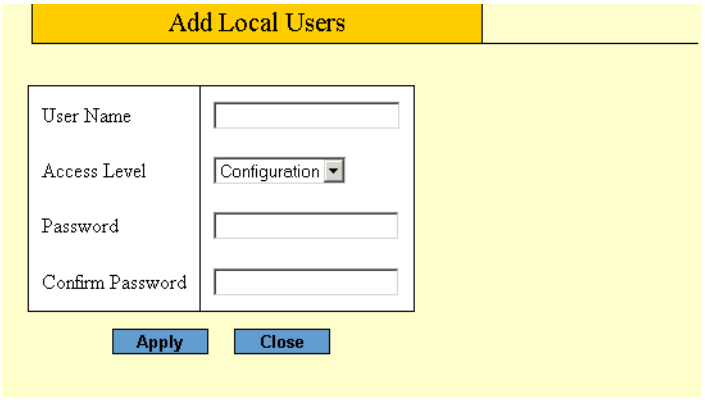


The *Local Users Page* displays the list of currently defined local users and contains the following fields:

- **User Name** — Displays the user's name.
- **Access Level** — Displays the user access level. The lowest user access level is 1 and the highest is 15. Users assigned access level 1 have read/write access to the device. User assigned a access level of 15 have read-only access. The possible field values are:
  - *Configuration* — Provides configuration device privileges.
  - *Monitoring* — Provides device Read and Read/Write privileges.

2. Click **Create**. The *Add Local User Page* opens:

Figure 25: Add Local User Page



In addition to the fields in the *Local Users Page*, the *Add Local User Page* contains the following fields:

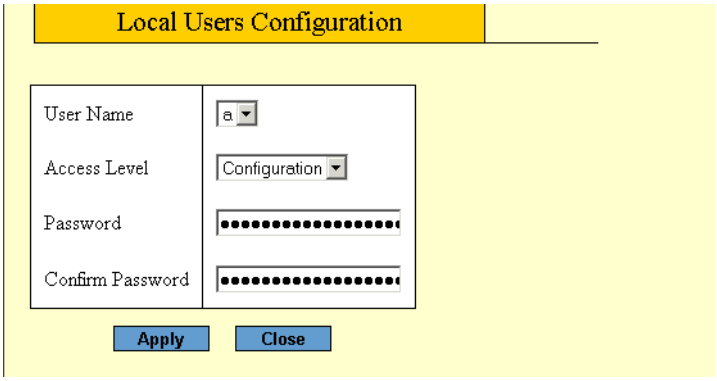
- **Password** — Defines the local user password. Local user passwords can contain up to 159 characters.
- **Confirm Password** — Verifies the password.

3. Define the fields.
4. Click **Apply**. The user is added to the Local Users table and the device is updated.

To modify local users:

1. Click **Mgmt. Security > Local Users**. The *Local Users Page* opens.
2. Click **Modify**. The *Local User Configuration Page* opens:

Figure 26: Local User Configuration Page



3. Define the *User Name*, *Access Level*, *Password*, and *Confirm Password* fields.
4. Click **Apply**. The local user settings are defined, and the device is updated.

Configuring Network Security

Network security manages locked ports. This section contains the following topics:

- Network Security Overview
- Managing Port Security
- Defining 802.1x Port Access
- Enabling Storm Control

Network Security Overview

Port-based authentication provides traditional 802.1x support, as well as, Guest VLANs. Guest VLANs limited network access to authorized ports. If a port is denied network access via port-based authorization, but the Guest VLAN is enabled, the port receives limited network access. For example, a network administrator can use Guest VLANs to deny network access via port-based authentication, but grant Internet access to unauthorized users.

Managing Port Security

Network security can be increased by limiting access on a specific port only to users with specific MAC addresses. The MAC addresses can be dynamically learned or statically configured. Locked port security monitors both received and learned packets that are received on specific ports. Access to the locked port is limited to users with specific MAC addresses. These addresses are either manually defined on the port, or learned on that port up to the point when it is locked. When a packet is received on a locked port, and the packet D-Link source MAC address is not tied to that port (either it was learned on a different port, or it is unknown to the system), the protection mechanism is invoked, and can provide various options. Unauthorized packets arriving at a locked port are either:

- Forwarded
- Discarded with no trap
- Discarded with a trap
- Shuts down the port.

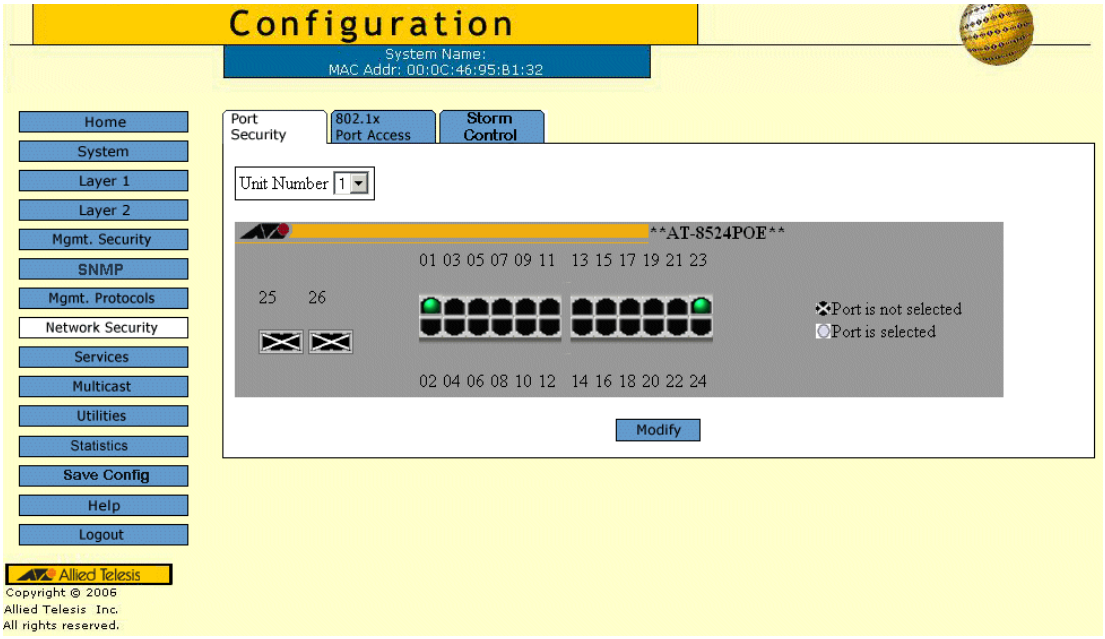
Locked port security also enables storing a list of MAC addresses in the configuration file. The MAC address list can be restored after the device has been reset. Disabled ports are activated from the *Port Security Page*. To define port security

The *Port Security Page* enhances network security by providing port locking management to network administrators.

To configure secure ports:

1. Click **Network Security > Port Security**. The *Port Security Page* opens:

Figure 27: Port Security Page

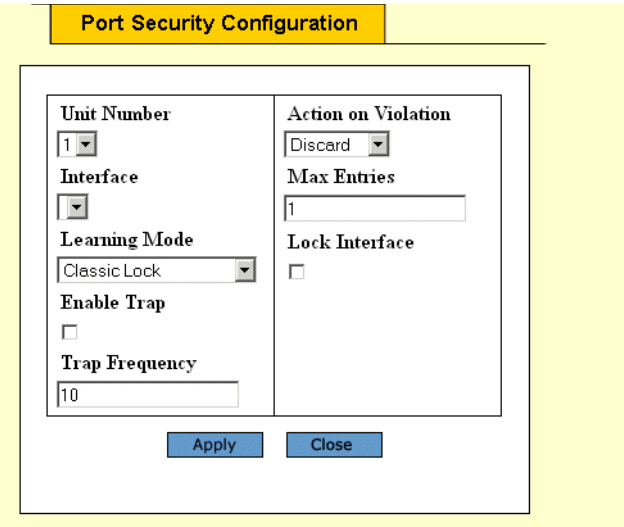


The *Port Security Page* displays the Zoom View of device ports. The possible port indicators are:

- *Port is not selected* — Indicates that security is currently not enabled on the port.
- *Port is selected* — Indicates that security is currently enabled on the port.

2. Select the ports to lock. The port indicator changes to *selected*.
3. Click **Modify**. The *Port Security Configuration Page* opens:

Figure 28: Port Security Configuration Page



The *Port Security Configuration Page* contains the following fields:

- **Unit Number** — Defines the unit number.
- **Interface** — Displays the port or LAG name.
- **Learning Mode —** Defines the locked port type. The Learning Mode field is enabled only if Locked is selected in the Set Port field.The possible field values are:
  - *Classic Lock* — Locks the port using the classic lock mechanism. The port is immediately locked, regardless of the number of addresses that have already been learned.
  - *Limited Dynamic Lock* — Locks the port by deleting the current dynamic MAC addresses associated with the port. The port learns up to the maximum addresses allowed on the port. Both relearning and aging MAC addresses are enabled.
- **Enable Trap** — Indicates if the SNMP trap generated if there is a violation. The possible values are:
  - *Yes* — Trap is generated.
  - *No* — No trap is generated.
- **Trap Frequency** — The time interval (in seconds) between traps. The possible field range is 1-1,000,000 seconds, and the default is 10 seconds.
- **Action On Violation**— Indicates the intruder action defined for the port. Indicates the action to be applied to packets arriving on a locked port. The possible values are:
  - *Forward* — Forwards packets from an unknown source without learning the MAC address.
  - *Discard* — Discards packets from any unlearned source. This is the default value.
  - *Shutdown* — Discards packets from any unlearned source and shuts down the port. The port remains shut down until reactivated, or until the device is reset.
- **Max Entries —** Specifies the number of MAC addresses that can be learned on the port before the port is locked. The field range is 1-128. The default is 1.
- **Lock Interface** —Locks the interface.

4. Select the security mode for the selected port(s).
5. Click **Apply**. The port security settings are saved and the device is updated.

6. Click **Save Config** on the menu to save the changes permanently.

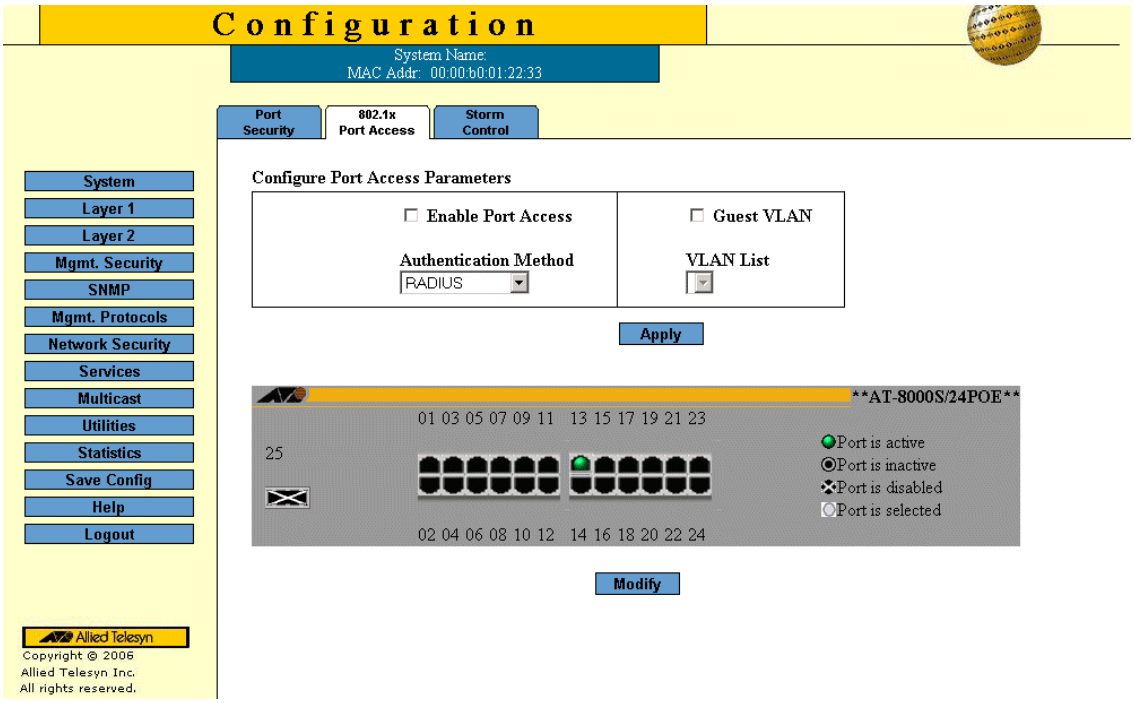
Defining 802.1x Port Access

The *802.1x Port Access Page* allows enabling port access globally, defining the authentication method, and configuration of port roles and settings.

To configure 802.1x port access parameters:

1. Click **Network Security > 802.1x Port Access**. The *802.1x Port Access Page* opens:

Figure 29: 802.1x Port Access Page



The *802.1x Port Access Page* contains the following fields:

- **Enable Port Access** — Enables the 802.1x port access globally. The possible values are:
  - *Checked* — Enables the 802.1x port access on the device.
  - *Unchecked* — Disables the 802.1x port access on the device. This is the default value.
- **Authentication Method** — Displays the method by which the last session was authenticated. The possible field values are:
  - *None* — Indicates that no authentication method is used to authenticate the port.
  - *RADIUS* — Provides port authentication using the RADIUS server.
  - *RADIUS, None* — Provides port authentication, first using the RADIUS server. If the port is not authenticated, then no authentication method is used, and the session is permitted.
- **Guest VLAN** —Provides limited network access to authorized ports. If a port is denied network access via port-based authorization, but the Guest VLAN field is enabled, the port receives limited network access.

For example, a network administrator can use Guest VLANs to deny network access via port-based authentication, but grant Internet access to unauthorized users. The possible field values are:

- *Enable* — Enables Guest VLANs.
- *Disable* — Disables Guest VLANs.

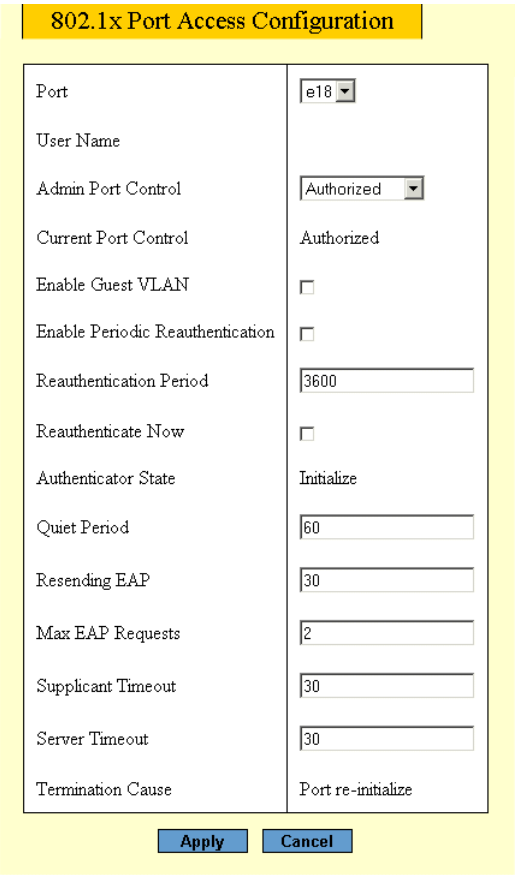
- **Guest VLAN ID** — Lists the currently defined VLANs.

2. Click **Enable Port Access**.
3. Select the *Authentication Method.*
4. Define the VLAN fields
5. Click **Apply**. The 802.1x access is configured globally and device information is updated.

To modify port based authentication settings:

1. Click **Settings**. The *Port Authentication Settings Page* opens:

Figure 30: Port Authentication Settings Page



The *Port Authentication Settings Page* contains the following port authentication parameters:

- **Port** — Displays a list of interfaces on which port-based authentication is enabled.
- **User Name** — Displays the supplicant user name.
- **Current Port Control** — Displays the current port authorization state. The possible field values are:

  - *Auto* — Enables port-based authentication on the device. The interface moves between an authorized or unauthorized state based on the authentication exchange between the device and the client.
  - *Authorized* — Indicates the interface is in an authorized state without being authenticated. The interface re-sends and receives normal traffic without client port-based authentication.
  - *Unauthorized* — Denies the selected interface system access by moving the interface into unauthorized state. The device cannot provide authentication services to the client through the interface.
- **Admin Port Control** — Indicates the port state. The possible field values are:
  - *Auto* —Enables port-based authentication on the device. The interface moves between an authorized or unauthorized state based on the authentication exchange between the device and the client.
  - *ForceAuthorized* — Indicates the interface is in an authorized state without being authenticated. The interface re-sends and receives normal traffic without client port-based authentication.
  - *ForceUnauthorized* — Denies the selected interface system access by moving the interface into unauthorized state. The device cannot provide authentication services to the client through the interface.
- **Enble Guest VLAN** — Indicates if the Guest VLAN is enabled. The possible field values are:
  - *Checked* — Enables the Guest VLAN.
  - *Unchecked* — Disables the Guest VLAN. This is the default value.
- **Enable Periodic Reauthentication** — Permits immediate port reauthentication. The possible field values are:
  - *Enable* — Enables immediate port reauthentication. This is the default value.
  - *Disable* — Disables port reauthentication.
- **Reauthentication Period** — Displays the time span (in seconds) in which the selected port is reauthenticated. The field default is 3600 seconds.
- **Reauthenticate Now** — Reauthenticates the port immediately.
- **Authenticator State** — Displays the current authenticator state (as defined in Admin Port Control).
- **Quiet Period** — Displays the number of seconds that the device remains in the quiet state following a failed authentication exchange. The possible field range is 0-65535. The field default is 60 seconds.
- **Resending EAP** — Defines the amount of time (in seconds) that lapses before EAP requests are resent. The field default is 30 seconds.
- **Max EAP Requests** — Displays the total amount of EAP requests sent. If a response is not received after the defined period, the authentication process is restarted. The field default is 2 retries.
- **Supplicant Timeout** — Displays the amount of time (in seconds) that lapses before EAP requests are resent to the supplicant. The field default is 30 seconds.
- **Server Timeout** — Displays the amount of time (in seconds) that lapses before the device re-sends a request to the authentication server. The field default is 30 seconds.
- **Termination Cause** — Indicates the reason for which the port authentication was terminated.

2. Click **Apply**. The port authentication configuration is saved and the device is updated.
3. Click **Save Config** on the menu to save the changes permanently.

Enabling Storm Control

Storm control limits the amount of unknown Unicast, Multicast and Broadcast frames accepted and forwarded by the device. When Layer 2 frames are forwarded, Broadcast, and Multicast frames are flooded to all ports on the relevant VLAN. This occupies bandwidth, and loads all nodes on all ports.

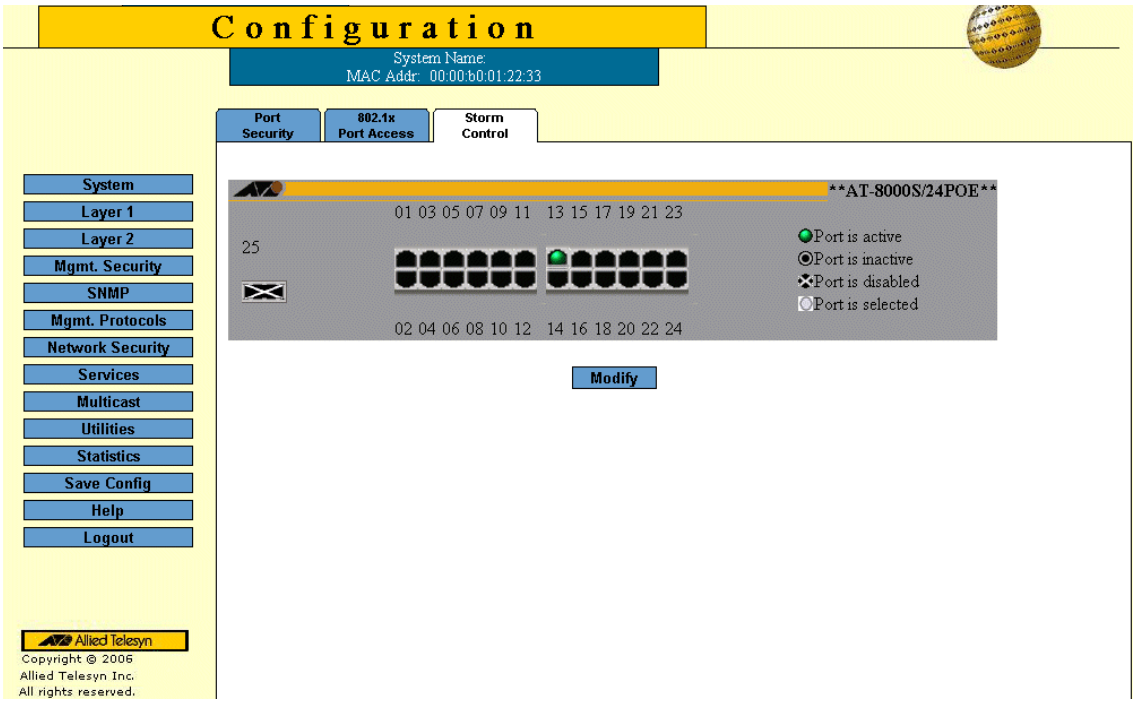
A Broadcast Storm is a result of an excessive amount of broadcast messages simultaneously transmitted across a network by a single port. Forwarded message responses are heaped onto the network, straining network resources or causing the network to time out.

Storm control is enabled for all ports by defining the packet type and the rate the packets are transmitted. The system measures the incoming Broadcast and Multicast frame rates separately on each port, and discards the frames when the rate exceeds a user-defined rate. The *Storm Control Page* provides fields for configuring broadcast storm control.

To enable storm control:

1. **Click Network Security > Storm Control**. The *Storm Control Page* opens:

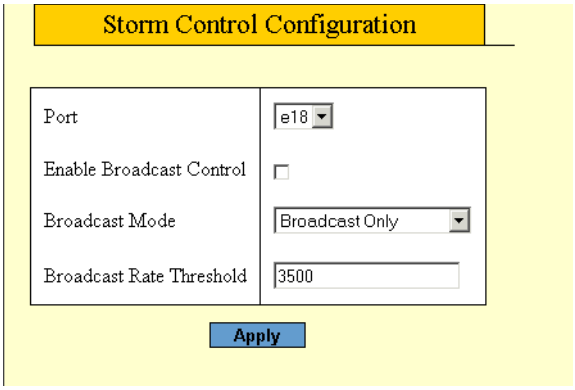
Figure 31: Storm Control Page



The *Storm Control Page* displays the Zoom View of device ports.

2. Select a port to configure. The port indicator changes to *Port is selected* (white).
3. Click **Modify**. The *Storm Control Configuration Page* opens:

Figure 32: Storm Control Configuration Page



The *Storm Control Configuration Page* contains the following fields:

- **Port —** Indicates the port from which storm control is enabled.
- **Enable Broadcast Control —** Indicates if forwarding Broadcast packet types is enabled on the port. The field values are:
  - *Enabled* — Enables storm control on the selected port.
  - *Disabled* — Disables storm control on the selected port.
- **Broadcast Mode —** Specifies the Broadcast mode currently enabled on the device.The possible field values are:
  - *Multicast & Broadcast* — Counts both Broadcast and Multicast traffic together.
  - *Broadcast* Only — Counts only the Broadcast traffic.
- **Broadcast Rate Threshold** — Indicates the maximum rate (kilobits per second) at which unknown packets are forwarded. The range is 70-100,000. The default value is 2500. The range for Giga ports is 3500-100,000.

4. Select the *Port Storm Control Settings*.
5. Click *Enable Broadcast Control*, and define the *Rate Threshold*.
6. Click **Apply**. Storm control is enabled on the device for the selected port.
7. Click **Save Config** on the menu to save the changes permanently.

Section 5. Configuring Ports

This section contains the procedures for configuring ports on the device.

This section contains the following topics:

- Defining Port Settings
- Configuring Port Mirroring
- Aggregating Ports
- Configuring LACP

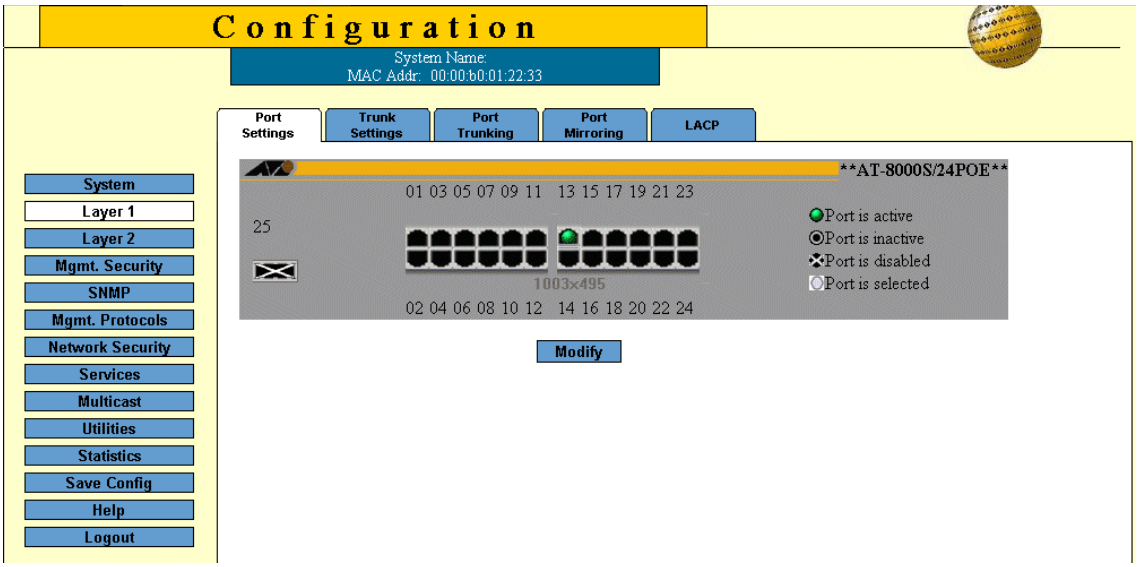
Defining Port Settings

The *Port Settings Page* contains fields for defining port parameters.

To define port general settings:

1. Click **Layer 1 > Port Settings**. The *Port Settings Page* opens:

Figure 33: Port Settings Page

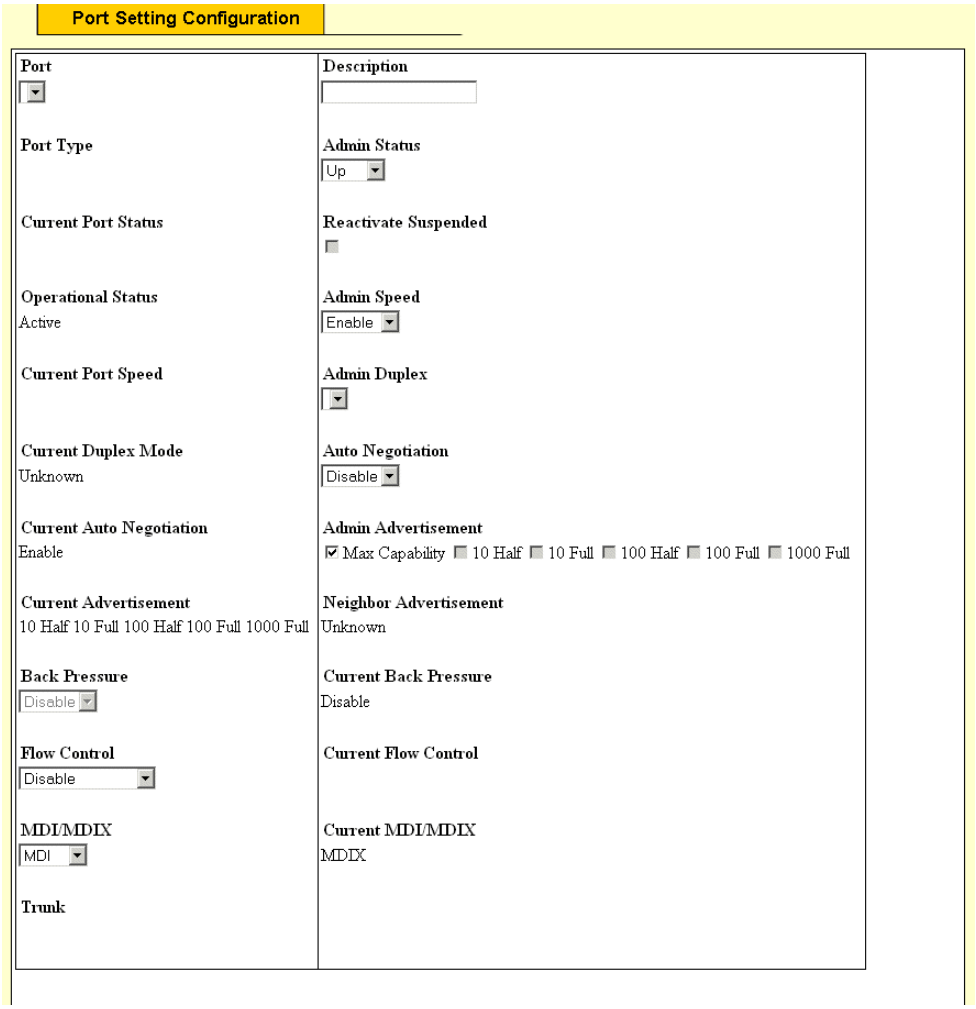


The *Port Settings Page* contains the Zoom View of the device ports. The possible port settings are:

- *Port is active* — Indicates the port is linked.
- *Port is inactive* — Indicates the port is not linked.
- *Port is disabled* — Indicates that the port is disabled.
- *Port is selected* — Indicates that the port is selected for modification.

2. Select the port(s). Clicking a port toggles it through the possible settings.
3. Click **Modify**. The *Modify Port Settings Page* opens:

Figure 34: Modify Port Settings Page



The *Modify Port Settings Page* contains the following fields:

- **Port—** Lists the names of configured ports.
- **Description —** Provides a user-defined port description.
- **Port Type —** Indicates the type of port.
- **Admin Status —** Displays the link operational status. Changes to the port state are active only after the device is reset. The possible field values are:
  - *Up* **—** Indicates that the port is currently operating.
  - *Down* **—** Indicates that the port is currently not operating.
- **Current Port Status —** Indicates whether the port is currently operational or non-operational. The possible field values are:
  - *Up* — Indicates the port is currently operating.

  - *Down* — Indicates the port is currently not operating.
- **Reactivate Suspended —** Reactivates suspended ports. The possible field values are:
  - *Checked* **—** Reactivates the selected suspended port.
  - *Unchecked* **—** Maintains the port status. This is the default value.
- **Operational Status —** Indicates the port operational status. Possible field values are:
  - *Suspended* — The port is currently active, and is not receiving or transmitting traffic.
  - *Active* — Indicates the port is currently active and is receiving and transmitting traffic.
  - *Disable* — Indicates the port is currently disabled, and is not receiving or transmitting traffic.
- **Admin Speed —** Indicates the configured rate for the port. The port type determines what speed setting options are available. Admin speed can only be designated when the port is disabled.
- **Current Port Speed —** Displays the configured rate for the port. The port type determines the speed settings available. Port speeds can only be configured when auto-negotiation is disabled. The possible field values are:
  - *10* — Indicates the port is currently operating at 10 Mbps.
  - *100* — Indicates the port is currently operating at 100 Mbps.
  - *1000* — Indicates the port is currently operating at 1000 Mbps.
- **Duplex Mode —** Displays the port duplex mode. This field is configurable only when auto negotiation is disabled, and the port speed is set to 10M or 100M. This field cannot be configured on LAGs. The possible field values are:
  - *Full* — The interface supports transmission between the device and its link partner in both directions
  - simultaneously.
  - *Half* — The interface supports transmission between the device and the client in only one direction at a time.
- **Auto Negotiation —** Displays the auto negotiation status on the port. Auto negotiation is a protocol between two link partners that enables a port to advertise its transmission rate, duplex mode, and flow control abilities to its partner.
- **Current Auto Negotiation —** Displays the current Auto Negotiation setting.
- **Current Advertisement —** Indicates the port advertises its speed to its neighbor port to start the negotiation process. The possible field values are those specified in the Admin Advertisement field.
- **Neighbor Advertisement** — Indicates the neighboring port's advertisement settings. The field values are identical to the Admin Advertisement field values.
- **Advertisement —** Defines the auto negotiation setting the port advertises. The possible field values are:
  - *Max Capability* — Indicates that all port speeds and duplex mode settings are accepted.
  - *10 Half* — Indicates that the port advertises for a 10 Mbps speed port and half duplex mode setting.
  - *10 Full* — Indicates that the port advertises for a 10 Mbps speed port and full duplex mode setting.
  - *100 Half* — Indicates that the port advertises for a 100 Mbps speed port and half duplex mode setting.
  - *100 Full* — Indicates that the port advertises for a 100 Mbps speed port and full duplex mode setting.
  - *1000 Full* — Indicates that the port advertises for a 1000 Mbps speed port and full duplex mode setting.
- **Back Pressure —** Displays the back pressure mode on the port. Back pressure mode is used with half duplex mode to disable ports from receiving messages.
- **Flow Control —** Displays the flow control status on the port. Operates when the port is in full duplex mode.
  - *Enable* — Indicates that flow control is currently enabled for the selected port. This is the default value.

  - *Disable* — Indicates that flow control is currently disabled for the selected port.

- **MDI/MDIX —** Displays the MDI/MDIX status on the port. Hubs and switches are deliberately wired opposite the way end stations are wired, so that when a hub or switch is connected to an end station, a straight through Ethernet cable can be used, and the pairs are matched up properly. When two hubs or switches are connected to each other, or two end stations are connected to each other, a crossover cable is used to ensure that the correct pairs are connected. The possible field values are:
  - *Auto* — Use to automatically detect the cable type.
  - *MDI (Media Dependent Interface)* — Use for end stations.
  - *MDIX (Media Dependent Interface with Crossover)* — Use for hubs and switches.

4. Define the fields.
5. Click **Apply**. The port settings are saved and the device is updated. The *Port Settings Page* is displayed.
6. Click **Save Config** on the menu to permanently save the change.

Configuring Port Mirroring

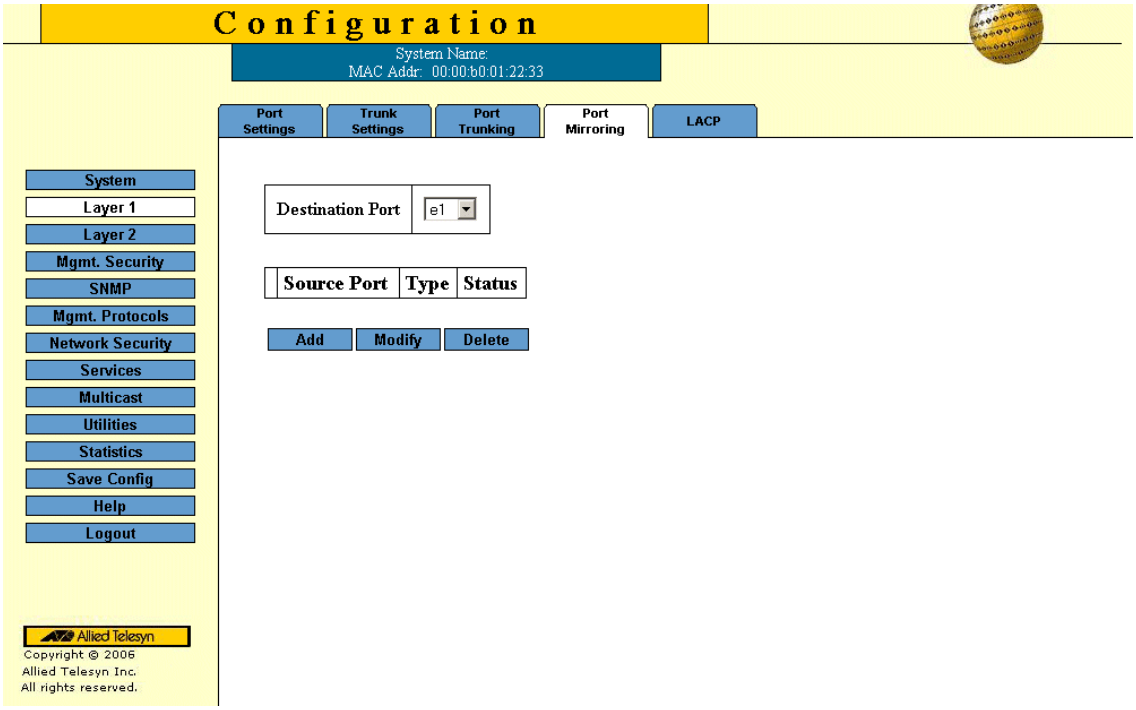
Port mirroring monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from one port to a monitoring port. Port mirroring can be used as a diagnostic tool as well as a debugging feature. Port mirroring also enables device performance monitoring.

Network administrators can configure port mirroring by selecting a specific port from which to copy all packets, and other ports to which the packets copied. Any number of ports on the device can be mirrors, except the destination port.

To define port mirroring:

1. Click **Layer 1 > Port Mirroring**. The *Port Mirroring Page* opens:

Figure 35: Port Mirroring Page



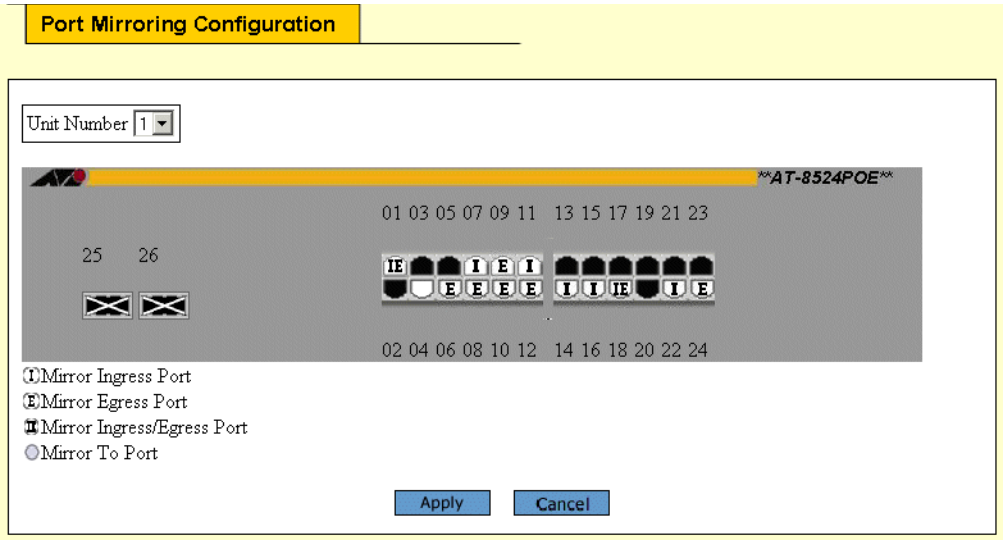
The *Port Mirroring Page* contains information about all port mirrors currently defined on the device. The following information is displayed:

- **Port Destination** — Defines the port number to which port traffic is copied. Note that this port has to be detached from its VLAN before mirroring is configured**.** Only one destination port can be defined. A zero value indicates that port mirroring is not enabled.
- **Source Port** — Indicates the port from which the packets are mirrored.
- **Type** — Indicates the port mode configuration for port mirroring. The possible field values are:
  - *RX* — Defines the port mirroring on receiving ports.
  - *TX* — Defines the port mirroring on transmitting ports.
  - *Both* — Defines the port mirroring on both receiving and transmitting ports. This is the default value.
- **Status** — Indicates if the port is currently monitored. The possible field values are:

- *Active* — Indicates the port is currently monitored.
- *Ready* — Indicates the port is not currently monitored.

2. Click **Modify**. The *Modify Mirror Page* opens:

Figure 36: Modify Mirror Page



The *Modify Mirror Page* contains the following fields:

- **Unit Number**— Displays the stacking member for which the port is defined.
- **Zoom View** - **Port Mirror** — Displays the status of mirror ports and enables port selection. The possible values are:

  Mirror to Port — Indicates the destination (mirror) port. There can be only one destination port.

  Mirror Ingress Port — Indicates that the port is currently defined as source port. The port's ingress traffic is mirrored to the destination port.

  Mirror Egress Port — Indicates that the port is currently defined as source port. The port's egress traffic is mirrored to the destination port.

  Mirror Ingress/Egress Port — Indicates that the port is currently defined as source port. The port's ingress and egress traffic is mirrored to the destination port.

3. Click the ports to mirror. Clicking a port toggles it through the possible settings.
4. Click **Enable Mirror**.
5. Click **Apply**. The port mirror status indicators are updated.
6. Click **Refresh** in the *Port Mirroring Page*. Port mirroring information is updated. The port mirror is now active on the device. You can connect a data analyzer to the destination port to monitor the traffic on the source ports.
7. Click **Save Config** on the menu to permanently save the change.

To modify or delete a port mirror:

1. Click **Layer 1 > Port Mirroring**. The *Port Mirroring Page* opens.
2. Click **Modify**. The *Modify Mirror Page* opens.
3. Click the checked **Enable Mirror** to disable the option.
4. Modify the mirror settings on the port(s) by toggling the port until the required mirror indicator is displayed. To delete the port mirror, toggle a port to its original (black) state.
5. Click **Enable Mirror** to enable the mirror again.
6. Click **Apply**. The destination port is modified. If indicated as black, the port is deleted from port mirrors list and is available for normal network operations.
7. Click **Save Config** on the menu to permanently save the change.

Aggregating Ports

Link Aggregation optimizes port usage by linking a group of ports together to form a single LAG. Aggregating ports multiplies the bandwidth between the devices, increases port flexibility, and provides link redundancy. The device supports both static LAGs and Link Aggregation Control Protocol (LACP) LAGs. LACP LAGs negotiate aggregating port links with other LACP ports located on a different device. If the other device ports are also LACP ports, the devices establish a LAG between them.

Ensure the following:

- All ports within a LAG must be the same media type.
- A VLAN is not configured on the port.
- The port is not assigned to a different LAG.
- Auto-negotiation mode is not configured on the port.
- The port is in full-duplex mode.
- All ports in the LAG have the same ingress filtering and tagged modes.
- All ports in the LAG have the same back pressure and flow control modes.
- All ports in the LAG have the same priority.
- All ports in the LAG have the same transceiver type.
- The device supports up to eight LAGs, and eight ports in each LAG.
- Ports can be configured as LACP ports only if the ports are not part of a previously configured LAG.
- Ports added to a LAG lose their individual port configuration. When ports are removed from the LAG, the original port configuration is applied to the ports.

This section contains the procedures for configuring static port trunks on the device.

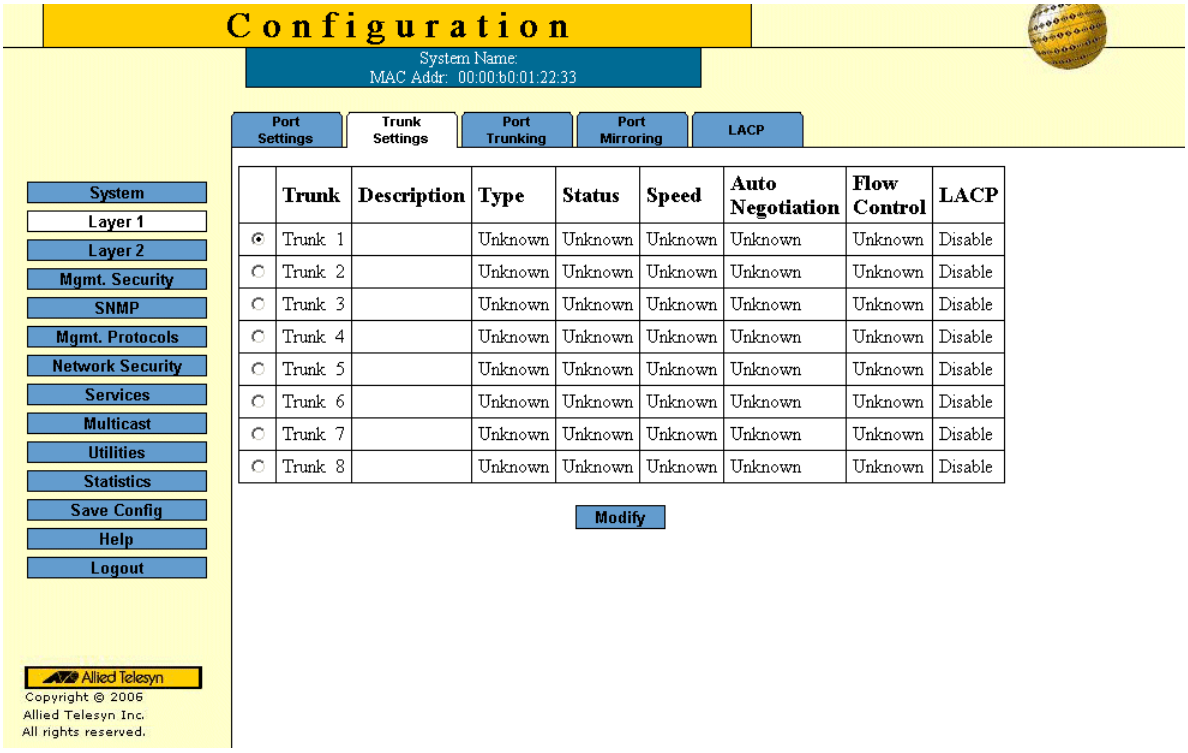
- Defining Trunk Settings
- Defining Port Trunking
- Configuring LACP

Defining Trunk Settings

The *Trunk Settings Page* contains parameters for defining Trunks. To define a port trunk:

1. Click **Layer 1 > Port Trunking**. The *Trunk Settings Page* opens:

Figure 37: Trunk Settings Page



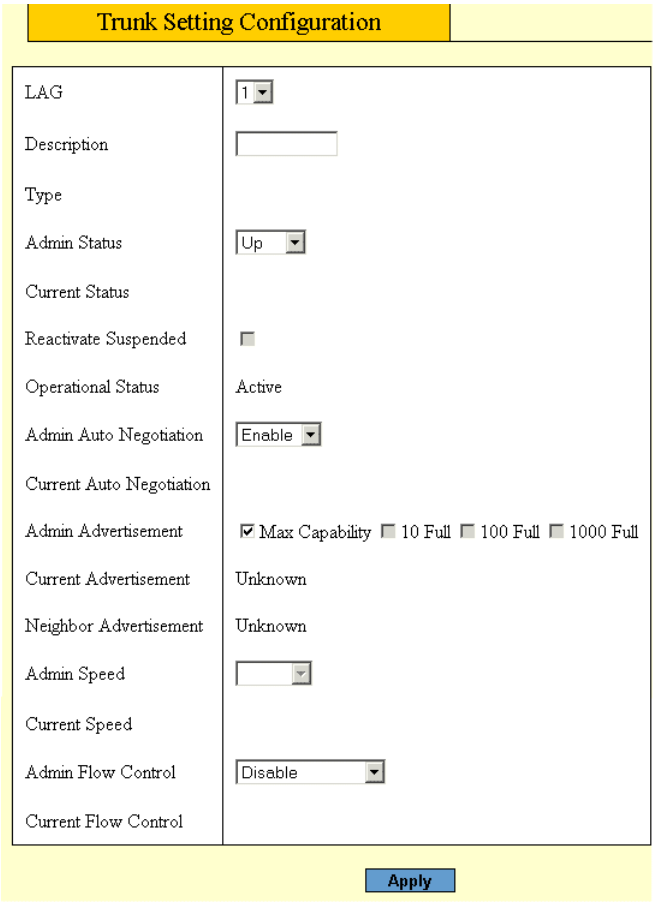
The *Trunk Settings Page* displays information about the currently defined trunks and contains the following fields:

- **Trunk** — Displays the trunk name.
- **Description** — Displays the user-defined trunk name and/or description.
- **Type** — Indicates the type of LAG defined by the first port assigned to the trunk. For example, 100-Copper, or 100-Fiber.
- **Status** — Indicates if the LAG is currently linked. The possible field values are:
  - *Up* — Indicates the LAG is currently linked, and is forwarding or receiving traffic.
  - *Down* — Indicates the LAG is not currently linked, and is not forwarding or receiving traffic.
- **Speed** — Displays the configured aggregated rate for the trunk. The possible field values are:
  - *10* — Indicates the port is currently operating at 10 Mbps.
  - *100* — Indicates the port is currently operating at 100 Mbps.
  - *1000* — Indicates the port is currently operating at 1000 Mbps.
- **Auto Negotiation** — Displays the auto negotiation status of the trunk. Auto negotiation is a protocol between two link partners that enables a port to advertise its transmission rate, duplex mode, and flow control abilities to its partner.

- **Flow Control** — Displays the flow control status of the trunk.
- **LACP** — Indicates if LACP is enabled on the trunk. The possible values are:
  - *Enable* — LACP is enabled on the trunk.
  - *Disable* — LACP is disabled on the trunk.

2. Click **Modify**. The *Trunk Settings Page* opens:

Figure 38: Trunk Configuration Settings Page



The *Trunk Settings Page* contains the following fields:

- **Trunk—** Lists the names of configured trunks.
- **Description —** Provides a user-defined trunk description.
- **Type —** Indicates the type of trunk.
- **Admin Status —** Displays the link operational status. Changes to the trunk state are active only after the device is reset. The possible field values are:
  - *Up* **—** Indicates that the trunk is currently operating.

  - *Down* **—** Indicates that the trunk is currently not operating.
- **Current Trunk Status —** Indicates whether the trunk is currently operational or non-operational. The possible field values are:
  - *Up* — Indicates the trunk is currently operating.
  - *Down* — Indicates the trunk is currently not operating.
- **Reactivate Suspended —** Reactivates suspended trunks. The possible field values are:
  - *Checked* **—** Reactivates the selected suspended trunk.
  - *Unchecked* **—** Maintains the trunk status. This is the default value.
- **Operational Status —** Indicates the trunk operational status. Possible field values are:
  - *Suspended* — The trunk is currently active, and is not receiving or transmitting traffic.
  - *Active* — Indicates the trunk is currently active and is receiving and transmitting traffic.
  - *Disable* — Indicates the trunk is currently disabled, and is not receiving or transmitting traffic.
- **Admin Speed —** Indicates the configured rate for the trunk. The trunk type determines what speed setting options are available. Admin speed can only be designated when the trunk is disabled.
- **Current Trunk Speed —** Displays the configured rate for the trunk. The trunk type determines the speed settings available. trunk speeds can only be configured when auto-negotiation is disabled. The possible field values are:
  - *10* — Indicates the trunk is currently operating at 10 Mbps.
  - *100* — Indicates the trunk is currently operating at 100 Mbps.
  - *1000* — Indicates the trunk is currently operating at 1000 Mbps.
- **Duplex Mode —** Displays the trunk duplex mode. This field is configurable only when auto negotiation is disabled, and the trunk speed is set to 10M or 100M. This field cannot be configured on LAGs. The possible field values are:
  - *Full* — The interface supports transmission between the device and its link partner in both directions
  - simultaneously.
  - *Half* — The interface supports transmission between the device and the client in only one direction at a time.
- **Auto Negotiation —** Displays the auto negotiation status on the trunk. Auto negotiation is a protocol between two link partners that enables a trunk to advertise its transmission rate, duplex mode, and flow control abilities to its partner.
- **Current Auto Negotiation —** Displays the current Auto Negotiation setting.
- **Current Advertisement —** Indicates the trunk advertises its speed to its neighbor trunk to start the negotiation process. The possible field values are those specified in the Admin Advertisement field.
- **Neighbor Advertisement** — Indicates the neighboring trunk's advertisement settings. The field values are identical to the Admin Advertisement field values.
- **Advertisement —** Defines the auto negotiation setting the trunk advertises. The possible field values are:
  - *Max Capability* — Indicates that all trunk speeds and duplex mode settings are accepted.
  - *10 Half* — Indicates that the trunk advertises for a 10 Mbps speed trunk and half duplex mode setting.
  - *10 Full* — Indicates that the trunk advertises for a 10 Mbps speed trunk and full duplex mode setting.
  - *100 Half* — Indicates that the trunk advertises for a 100 Mbps speed trunk and half duplex mode setting.
  - *100 Full* — Indicates that the trunk advertises for a 100 Mbps speed trunk and full duplex mode setting.

  - *1000 Full* — Indicates that the trunk advertises for a 1000 Mbps speed trunk and full duplex mode setting.

- **Back Pressure —** Displays the back pressure mode on the trunk. Back pressure mode is used with half duplex mode to disable trunks from receiving messages.
- **Flow Control —** Displays the flow control status on the trunk. Operates when the trunk is in full duplex mode.
  - *Enable* — Indicates that flow control is currently enabled for the selected trunk. This is the default value.
  - *Disable* — Indicates that flow control is currently disabled for the selected trunk.
- **MDI/MDIX —** Displays the MDI/MDIX status on the trunk. Hubs and switches are deliberately wired opposite the way end stations are wired, so that when a hub or switch is connected to an end station, a straight through Ethernet cable can be used, and the pairs are matched up properly. When two hubs or switches are connected to each other, or two end stations are connected to each other, a crossover cable is used to ensure that the correct pairs are connected. The possible field values are:
  - *Auto* — Use to automatically detect the cable type.
  - *MDI (Media Dependent Interface)* — Use for end stations.
  - *MDIX (Media Dependent Interface with Crossover)* — Use for hubs and switches.

3. Modify the fields.
4. Click **Apply**. The Trunk settings are saved and the device is updated.

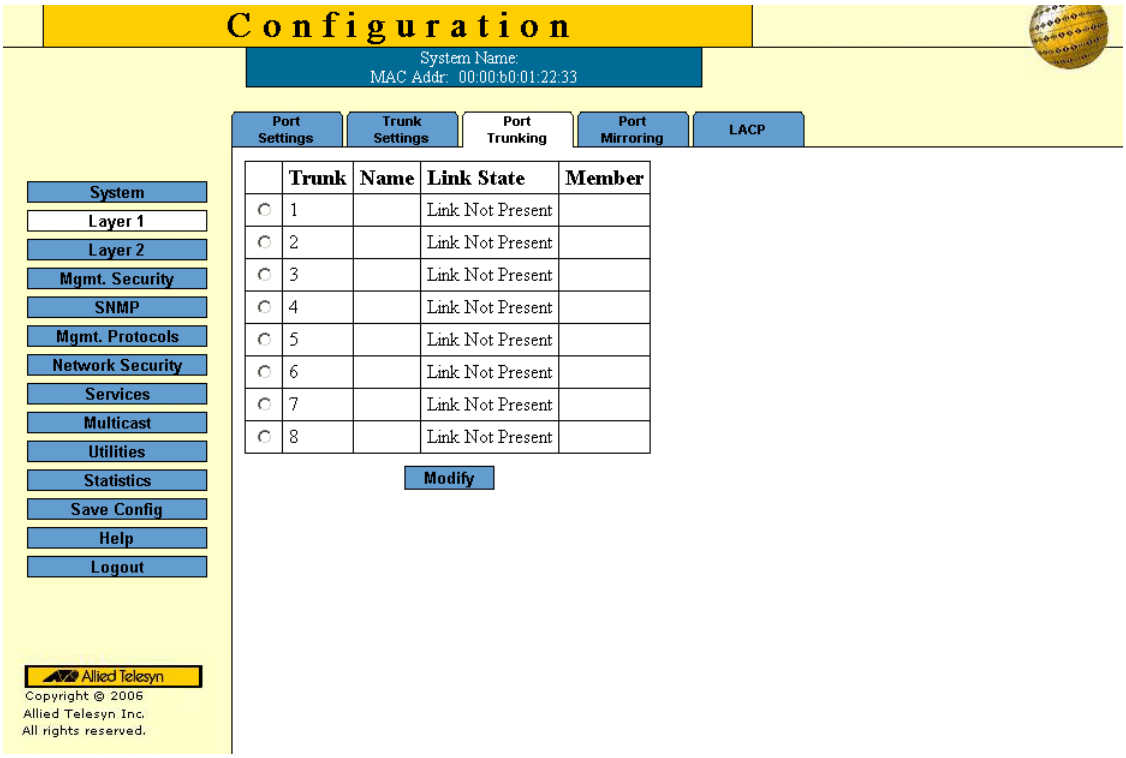
Defining Port Trunking

The *Port Trunking Page* displays information about the defined trunks.

To modify Port Trunking settings:

1. Click **Layer 1 > Port Trunking**. The *Trunk Settings Page* opens:

Figure 39: Port Trunking Page

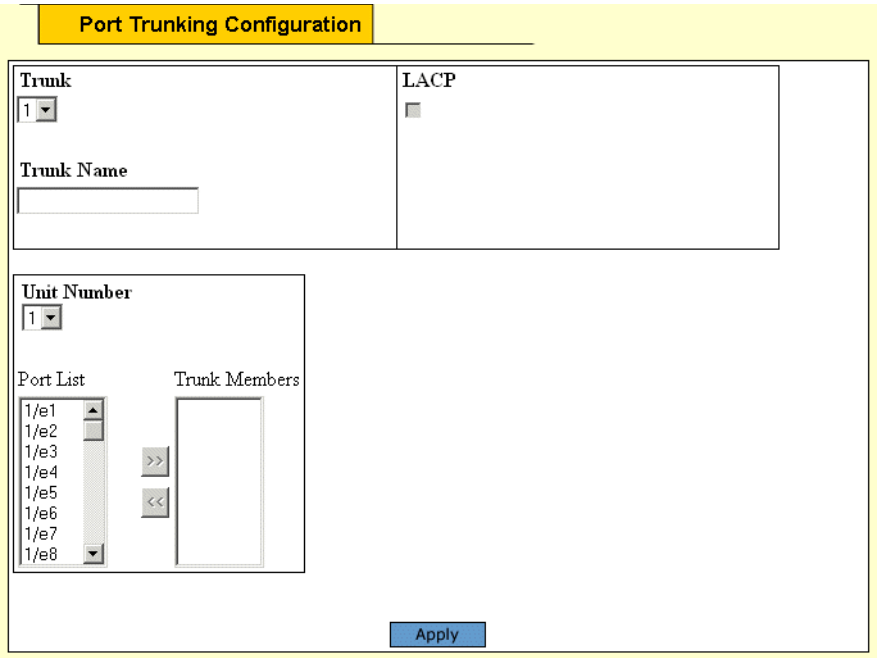


The *Port Trunking Page* contains information about all port trunks currently defined on the device. The following information is displayed:

- **Trunk** — Displays the ID number of the trunk.
- **Name** — Displays the name of the trunk. The name can be up to sixteen alphanumeric characters. No spaces or special characters, such as asterisks and exclamation points, are allowed. Each trunk must be given a unique name.
- **Link State** —Indicates the current link status.
- **Members** — Indicates the ports which are defined for the trunk.

2. Select the trunk to modify.
3. Click **Modify**. The *Modify Trunk Page* opens:

Figure 40: Modify Trunk Page



In addition to the fields in the The *Port Trunking Page* , the *Modify Trunk Page* contians the following additional field:

- **LACP** — Indicates if LACP is enabled on the trunk. The possible field values are:
  - *Checked* — Enables LACP on the trunk.
  - *Unchecked* — Disables LACP on the trunk. This is the default value.

4. Modify the *Trunk ID*, *LACP, Unit Number, and Trunk(LAG) Name* fields.
5. Select the ports for the trunk from the *Port List* using the >> arrow. The selected ports are displayed as Trunk Members.
6. Click **Apply**. Trunking information is modified and the device is updated.
7. Click **Save Config** in the *Trunk Settings Page* menu to permanently save the changes.

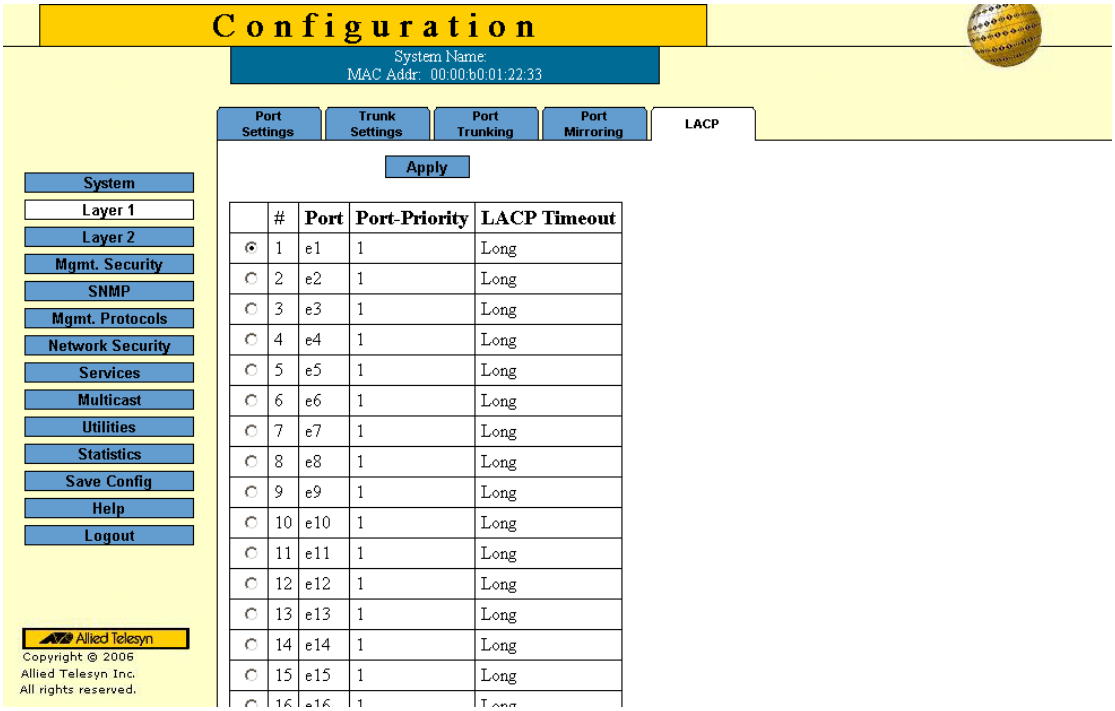
Configuring LACP

LAG ports can contain different media types if the ports are operating at the same speed. Aggregated links can be set up manually or automatically established by enabling *Link Aggregation Control Protocol* (LACP) on the relevant links. Aggregate ports can be linked into link-aggregation port-groups. Each group is comprised of ports with the same speed. The *LACP Page* contains fields for configuring LACP LAGs.

To configure LACP for LAGs:

1. Click **Layer 1 > LACP**. The *LACP Page* opens:

Figure 41: LACP Page



The *LACP Page* contains the following fields:

- **LACP System Priority** — Specifies system priority value. The field range is 1-65535. The field default is 1.
- **Unit Number** — Displays the stacking member for which the LAG parameters are defined.
- **Port** — Displays the port number to which timeout and priority values are assigned.
- **Port Priority** — Displays the LACP priority value for the port. The field range is 1-65535.
- **LACP Timeout** — Displays the administrative LACP timeout.

2. Click **Modify**. the *Modify LACP Settings Page* opens:
3. Define the fields.
4. Click **Apply**. The LACP settings are saved and the device is updated.

Section 6. Configuring Interfaces

This section contains information on configuring the interfaces of the device.

This section describes the following topics:

- Defining MAC Addresses
- Configuring VLANs

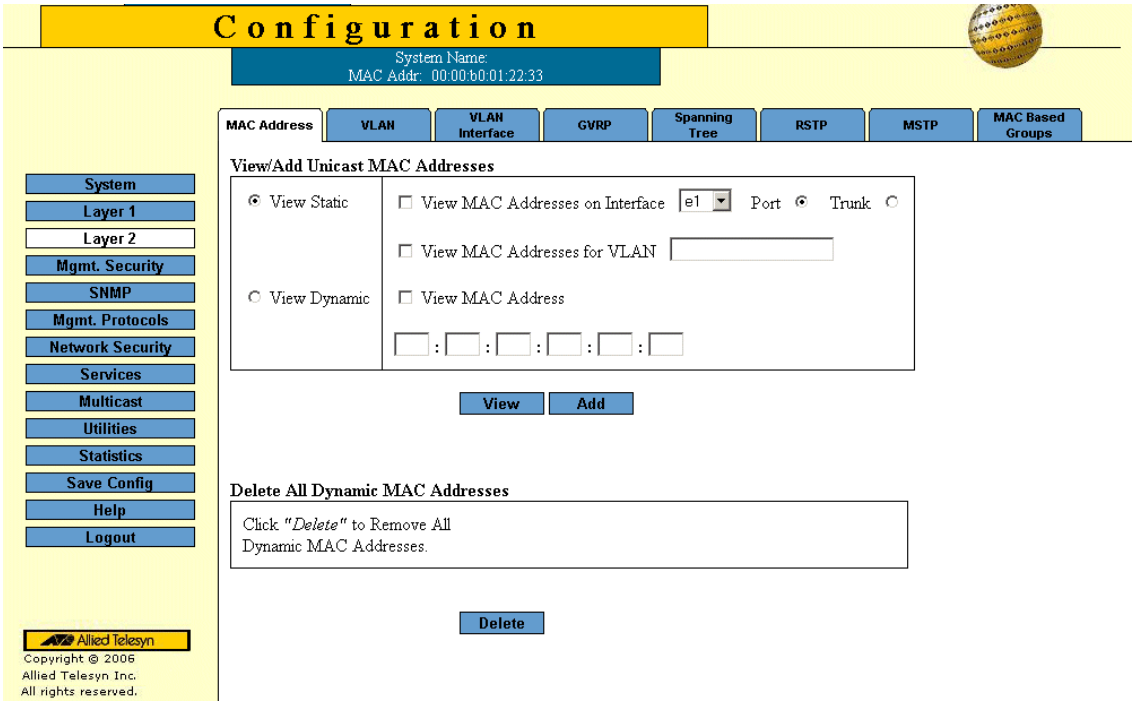
Defining MAC Addresses

The *MAC Address Page* contains parameters for querying information in the Static Mac Address Table and the Dynamic MAC Address Table. The MAC Address tables contain address parameters by which packets are directly forwarded to the ports and can be sorted by interface, VLAN, and MAC Address.

To configure MAC addresses:

1. Click **Layer 2 > MAC Address**. The *MAC Address Page* opens:

Figure 42: MAC Address Page



The *MAC Address Page* contains the following sections:

- **View/Add Unicast MAC Addresses** — Enables viewing and configuring Unicast addresses.
- **View/Add Multicast MAC Addresses** — Enables viewing and configuring Multicast addresses.

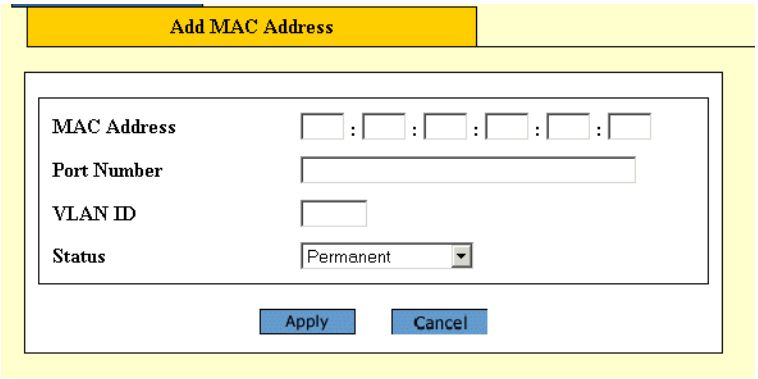
The fields in both page sections are the same. Only one page can be selected at a time. The default selection is the *View All* option for Multicast MAC addresses.

The *MAC Address Page* contains the following fields:

- **View All** — Displays all dynamic addresses learned on the ports of the device and all static addresses that have been assigned to the ports.
- **View Static** — Displays the static addresses assigned to the ports on the device.
- **View Dynamic** — Displays the dynamic addresses learned on the ports on the device.
- **View MAC Addresses on Port** — Displays the dynamic and static MAC addresses of a port. You can specify more than one port at a time.
- **View MAC Addresses for VLAN** — Displays the static and dynamic addresses learned on the tagged and untagged ports of a specific VLAN. You specify the VLAN by entering the VLAN ID. Only one VLAN can be defined at a time.
- **View MAC Address** — Displays the number of the port on which a MAC address was assigned or learned. To find out on which port a particular MAC address was learned, even if the device is part of a large network, you can just specify the MAC address. The system automatically locates the port on the device where the device is connected.

2. Define the fields for the Unicast or Multicast MAC addresses to add.
3. Click **Add**. The *Add MAC Address Page* opens:

Figure 43: Add MAC Address Page



The *Add MAC Address Page* contains the following fields:

- **MAC Address** —Defines the static or dynamic Unicast MAC address.
- **Port Number** —Indicates the port on which the address was learned or assigned. The MAC address with port "CPU" is the address of the device.
- **VLAN ID** — Displays the VLAN ID number to which the entry refers.
- **Status** — Indicates the current status of the address. The possible values are:
  - *Permanent* — The MAC address is permanent.
  - *Delete on Reset* — The MAC address is deleted when the device is reset.
  - *Delete on Timeout* — The MAC address is deleted when a timeout occurs.
  - *Secure Options* — The MAC Address is defined for locked ports.

Note

When viewed, the information also includes the *Type* of the address: static or dynamic.

4. Click **Apply**. The new MAC address is added to the addresses table and the device information is updated.

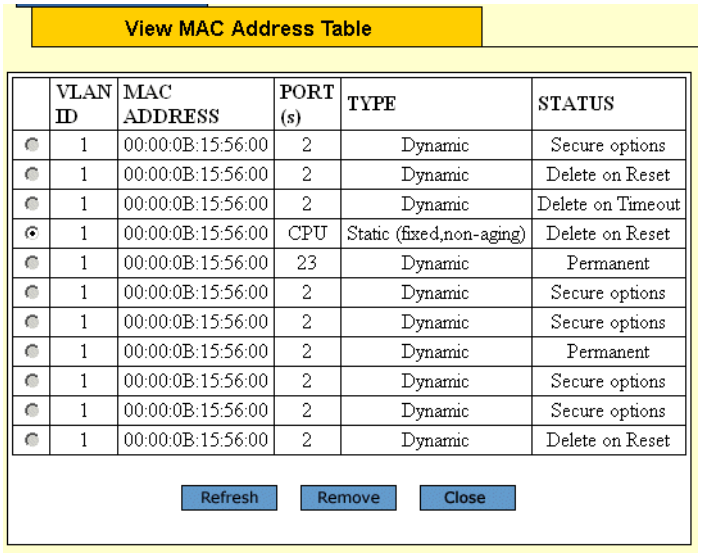
To delete all MAC addresses:

1. Click **Layer 2 > MAC Address**. The *MAC Address Page* opens.
2. Click **Delete** in the *Delete All MAC Addresses* section of the *MAC Address Page*. All addresses are cleared from the Dynamic MAC Address Table and the device begins to learn new addresses as packets arrive on the ports.

To view or remove MAC addresses:

1. Click **Layer 2 > MAC Address**. The *MAC Address Page* opens.
2. Click **View** in either *View/Add Unicast MAC Addresses* section or the *View/Add Multicast MAC Addresses* section. The *View MAC Address Table Page* opens:

Figure 44: View MAC Address Table Page



The *View MAC Address Table Page* displays all MAC addresses of the selected type (Unicast or Multicast).

3. Click the radio button to select a *VLAN ID*.
4. Click **Remove**. The MAC Address is deleted from the list.
5. Click **Refresh**. The Mac Addresses information is updated.
6. Click **Close**. The *View MAC Address Table Page* is displayed.

Configuring VLANs

This section describes how to create and configure Virtual LANs (VLANs).

VLANs are logical subgroups with a Local Area Network (LAN) which combine user stations and network devices into a single unit, regardless of the physical LAN segment to which they are attached. VLANs allow network traffic to flow more efficiently within subgroups. VLANs use software to reduce the amount of time it takes for network changes, additions, and moves to be implemented.

VLANs have no minimum number of ports, and can be created per unit, per device, or through any other logical connection combination, since they are software-based and not defined by physical attributes.

VLANs function at Layer 2. Since VLANs isolate traffic within the VLAN, a Layer 3 router working at a protocol level is required to allow traffic flow between VLANs. Layer 3 routers identify segments and coordinate with VLANs. VLANs are Broadcast and Multicast domains. Broadcast and Multicast traffic is transmitted only in the VLAN in which the traffic is generated. VLAN tagging provides a method of transferring VLAN information between VLAN groups. VLAN tagging attaches a 4-byte tag to packet headers. The VLAN tag indicates to which VLAN the packets belong. VLAN tags are attached to the VLAN by either the end station or the network device. VLAN tags also contain VLAN network priority information.

Combining VLANs and *Generic Attribute Registration Protocol* (GARP) allows network managers to define network nodes into Broadcast domains.

When configuring VLANs ensure the following:

- When using this feature, the management VLAN must exist on each 8000S Series device that you want to manage.
- All of the devices in an enhanced stack must use the same management VLAN. Consequently, you must use the following procedure to specify the management VLAN on each slave and master device of an enhanced stack.
- The uplink and downlink ports on each device that are functioning as the tagged or untagged data links between the devices must be either tagged or untagged members of the management VLAN.
- The port on the device to which the management station is connected must be a member of the management VLAN.

This section contains the following topics:

- Defining VLAN Properties
- Defining VLAN Interface Settings
- Defining GVRP

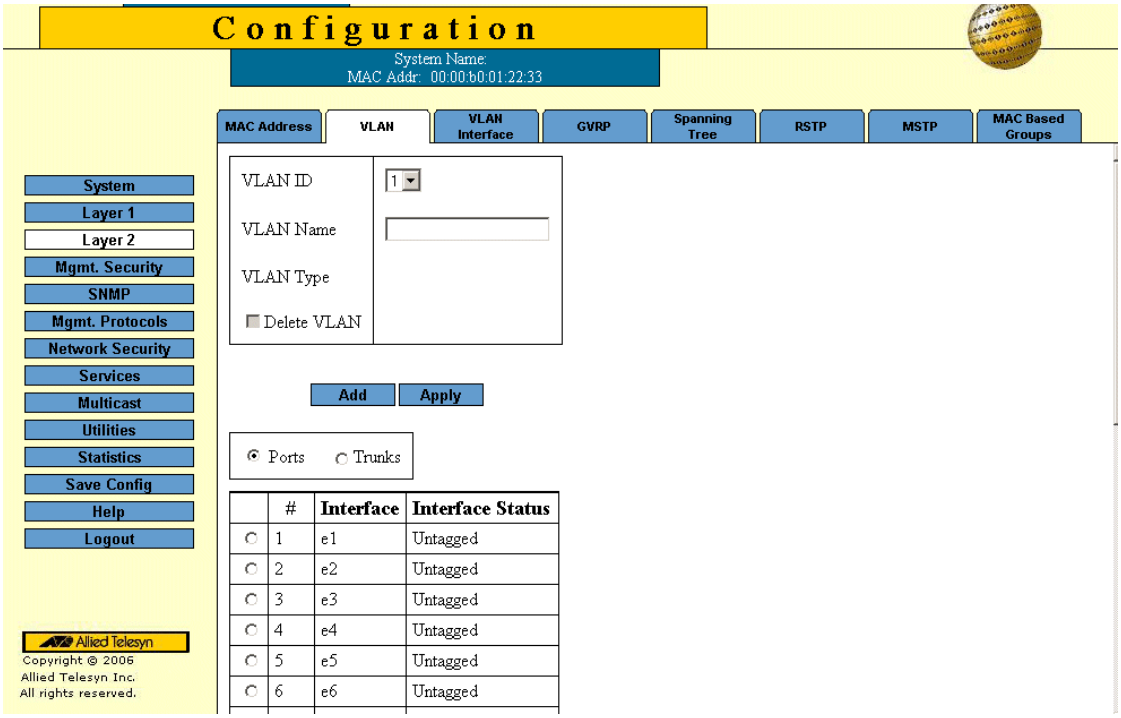
Defining VLAN Properties

The *VLAN Page* provides information and global parameters for configuring and working with VLANs.

To configure a VLAN:

1. Click **Layer 2 > VLAN**. The *VLAN Page* opens:

Figure 45: VLAN Page



The *VLAN Page* contains the following fields:

- **Select VLAN ID** — Contains a drop-down list of the currently configured VLAN IDs.
- **Show All** — Displays all currently configured VLANs.
- **VLAN ID** — Displays the VLAN ID.
- **VLAN Name** — Displays the user-defined VLAN name. This is a required field.
- **VLAN Type** — Displays the VLAN type. The possible field values are:
  - *Dynamic* — Indicates the VLAN was dynamically created through GARP.
  - *Static* — Indicates the VLAN is user-defined.
  - *Default* — Indicates the VLAN is the default VLAN.
- **Authentication** — Indicates whether unauthorized users can access a Guest VLAN. The possible field values are:
  - *Enable* — Enables unauthorized users to use the Guest VLAN.
  - *Disable* — Disables unauthorized users from using the Guest VLAN.

The Zoom View shows port representation on the device and enables selecting ports for the VLAN. The Zoom View of VLAN ports includes the following indicators:

- **I** — **Include** — Indicates that the port is included in the VLAN.
- **E** — **Exclude** — Indicates that the port is excluded from the VLAN.
- **F** — **Forbidden** — Indicates that the port cannot be included in the VLAN.

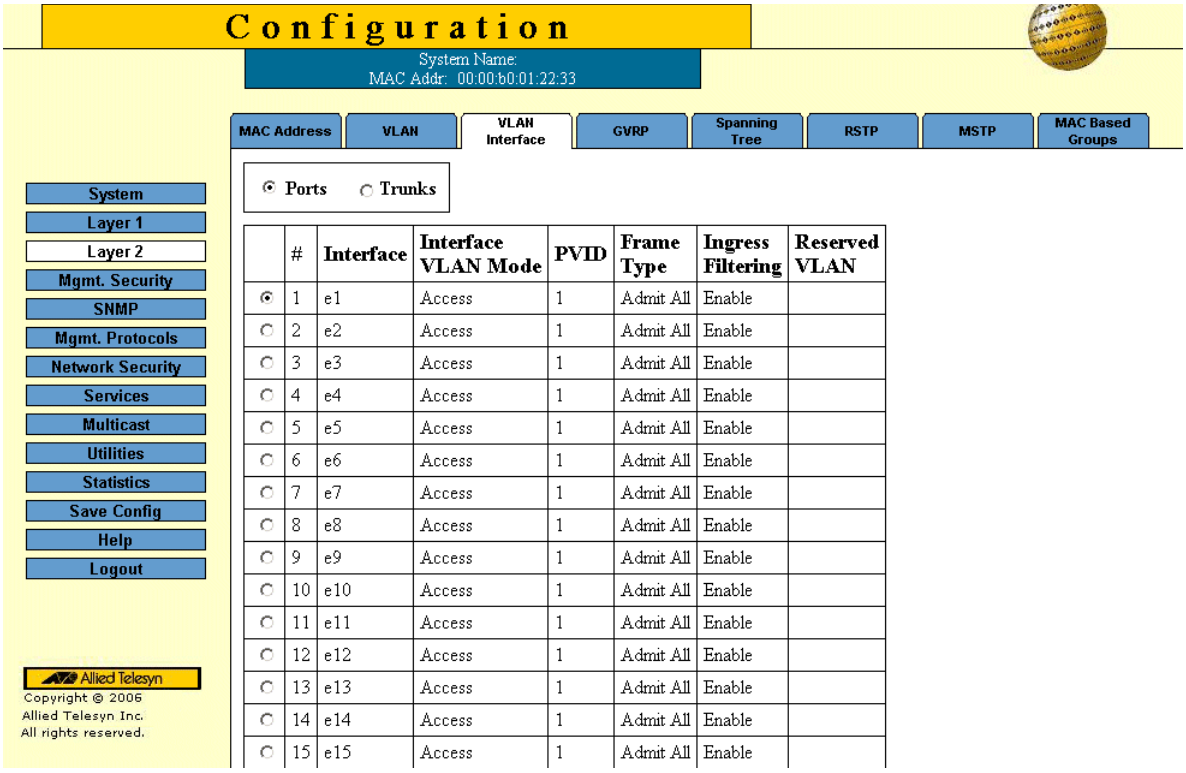
Defining VLAN Interface Settings

The *VLAN Member Interface Settings Page* contains fields for managing ports that are part of a VLAN. The *Port Default VLAN ID* (PVID) is configured on the *Modify Interface Configuration Page*. All untagged packets arriving at the device are tagged with the port PVID.

To define VLAN interface.

1. Click **Layer 2 > VLAN Interface**. The *VLAN Interface Page* opens:

Figure 46: VLAN Interface Page



	#	Interface	Interface VLAN Mode	PVID	Frame Type	Ingress Filtering	Reserved VLAN
◉	1	e1	Access	1	Admit All	Enable	
○	2	e2	Access	1	Admit All	Enable	
○	3	e3	Access	1	Admit All	Enable	
○	4	e4	Access	1	Admit All	Enable	
○	5	e5	Access	1	Admit All	Enable	
○	6	e6	Access	1	Admit All	Enable	
○	7	e7	Access	1	Admit All	Enable	
○	8	e8	Access	1	Admit All	Enable	
○	9	e9	Access	1	Admit All	Enable	
○	10	e10	Access	1	Admit All	Enable	
○	11	e11	Access	1	Admit All	Enable	
○	12	e12	Access	1	Admit All	Enable	
○	13	e13	Access	1	Admit All	Enable	
○	14	e14	Access	1	Admit All	Enable	
○	15	e15	Access	1	Admit All	Enable	

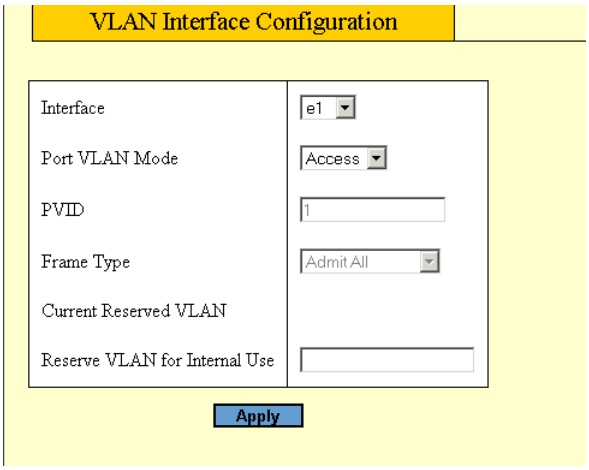
The *VLAN Interface Page* displays the VLAN interface information for a selected Port/Unit or Trunk:

- **Port Interface** — Displays the port number included in the VLAN.
- **PVID** — Assigns a VLAN ID to untagged packets. The possible values are 1-4094. VLAN 4095 is defined as per standard and industry practice as the Discard VLAN. Packets classified to the Discard VLAN are dropped.
- **Ingress Filtering** — Indicates whether ingress filtering is enabled on the port. The possible field values are:
  - *Enable* — Enables ingress filtering on the device. Ingress filtering discards packets that are defined to VLANs of which the specific port is not a member.
  - *Disable* — Disables ingress filtering on the device.
- **Reserve VLAN for Internal Use** — Indicates which VLAN is reserved for internal use by the system. One VLAN must be reserved.
- **Port VLAN Mode** — Displays the port mode. The possible values are:

  - *General* — Indicates the port belongs to VLANs, and each VLAN is user-defined as tagged or untagged (full IEEE802.1q mode).
  - *Access* — Indicates a port belongs to a single untagged VLAN. When a port is in Access mode, the packet types which are accepted on the port cannot be designated. Ingress filtering cannot be enabled or disabled on an access port.
  - *Trunk* — Indicates the port belongs to VLANs in which all ports are tagged, except for one port that can be untagged.
- **Frame Type** — Specifies the packet type accepted on the port. The possible field values are:
  - *Admit Tag Only* — Only tagged packets are accepted on the port.
  - *Admit All* — Both tagged and untagged packets are accepted on the port.
- **Current Reserved VLAN** — Indicates that the VLAN selected by the user is reserved, if not in use by the system.

2. Click **Modify**. The *Modify Interface Configuration Page* opens:

Figure 47: Modify Interface Configuration Page



3. Define the fields.
4. Click **Apply**. The VLAN interface configuration is saved and the device is updated.

Defining GVRP

This section explains how to configure GVRP on the device. *GARP VLAN Registration Protocol* (GVRP) is specifically provided for automatic distribution of VLAN membership information among VLAN-aware bridges. GVRP allows VLAN-aware bridges to automatically learn VLANs to bridge ports mapping, without having to individually configure each bridge and register VLAN membership. This section describes the following topics:

- Configuring GVRP
- Enabling/Disabling GVRP on a Port

Notes

- GVRP cannot be configured if MSTP is enabled on the device.
- The Default button returns all GVRP parameter settings to their default values.

Caution

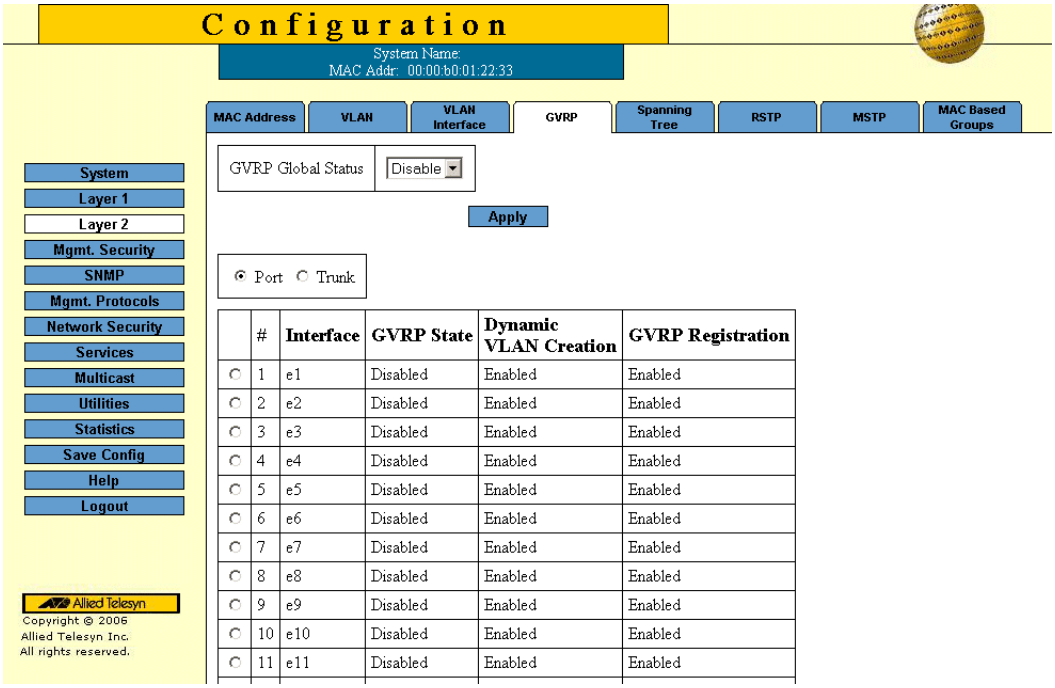
The settings for the three GVRP timers must be the same on all GVRP-active devices in your network.

Configuring GVRP

To define GVRP on the device:

1. Click **Layer 2 > GVRP**. The *GVRP Page* opens:

Figure 48: GVRP Page



The *GVRP Page* contains the following fields:

- **GVRP Global Status** — Indicates if GVRP is enabled on the device. The possible field values are:

  - *Enable* — Enables GVRP on the selected device.
  - *Disable* — Disables GVRP on the selected device.

- **Port** — Displays the ports table.
- **Trunk** — Displays the trunks table.
- **Interface** — Displays the port or trunk on which GVRP is enabled. The possible field values are:
  - *Port* — Indicates the port number on which GVRP is enabled.
  - *Trunk* — Indicates the LAG number on which GVRP is enabled.
- **GVRP State** — Indicates if GVRP is enabled on the port. The possible field values are:
  - *Enable* — Enables GVRP on the selected port.
  - *Disable* — Disables GVRP on the selected port.
- **Dynamic VLAN Creation —** Indicates if Dynamic VLAN creation is enabled on the interface. The possible field values are:
  - *Enable* — Enables Dynamic VLAN creation on the interface.
  - *Disable* — Disables Dynamic VLAN creation on the interface.
- **GVRP Registration —** Indicates if VLAN registration through GVRP is enabled on the device. The possible field values are:
  - *Enable* — Enables GVRP registration on the device.
  - *Disable* — Disables GVRP registration on the device.

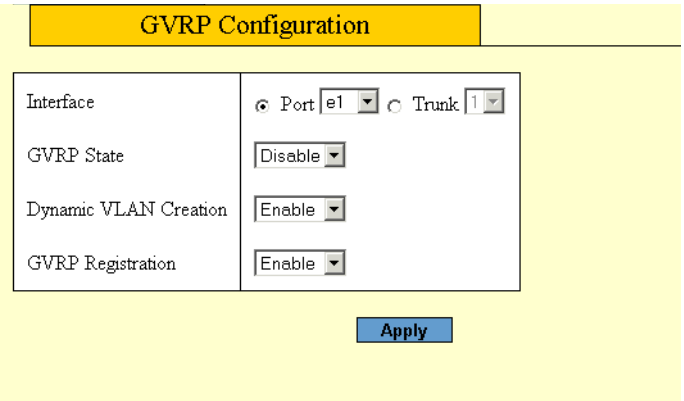
2. Select **Enable GVRP**.
3. Define the GVRP parameters.
4. Click **Apply**. The global GVRP parameters are saved and the device is updated.
5. Click **Save Config** on the menu to permanently save the change.
6. Select *Port* and *Unit* or Trunk.
7. Click **Modify**. The *GVRP Port Configuration Page* opens:

Enabling/Disabling GVRP on a Port

To modify the GVRP ports:

1. Click **Layer 2 > GVRP**. The *GVRP Page* opens.
2. Select *Port* and *Unit* or Trunk in the *GVRP Port Configuration* section.
3. Click **Modify**. The *GVRP Port Configuration Page* opens:

Figure 49: GVRP Port Configuration Page



- **Unit Number** — The stacking member for which the GVRP parameters are displayed.
- **Interface** — Displays the port on which GVRP is enabled. The possible field values are:
  - *Port* — Indicates the port number on which GVRP is enabled.
  - *LAG* — Indicates the LAG number on which GVRP is enabled.
- **GVRP State** — Indicates if GVRP is enabled on the port. The possible field values are:
  - *Enabled* — Enables GVRP on the selected port.
  - *Disabled* — Disables GVRP on the selected port.
- **Dynamic VLAN Creation** — Indicates if Dynamic VLAN creation is enabled on the interface. The possible field values are:
  - *Enabled* — Enables Dynamic VLAN creation on the interface.
  - *Disabled* — Disables Dynamic VLAN creation on the interface.
- **GVRP Registration** — Indicates if VLAN registration through GVRP is enabled on the device. The possible field values are:
  - *Enabled* — Enables GVRP registration on the device.
  - *Disabled* — Disables GVRP registration on the device.

4. Select the interface (Port or Trunk).
5. Define the *GVRP State* and *GVRP Registration* fields.
6. Click **Apply**. The change to the GVRP mode is activated on the selected interface.

Section 7. Configuring System Logs

This section provides information for managing system logs. System logs enable viewing device events in real time and recording the events for later usage. System Logs record and manage events, and report errors and informational messages.

This section includes the following topics:

- Defining Log Settings
- Configuring Log Servers
- Setting System Log Display
- Clearing Event Logs
- Viewing Flash Logs

Defining Log Settings

Event messages have a unique format, which is the Syslog protocols recommended message format for all error reporting. For example, Syslog and local device reporting messages are assigned a severity code and include a message mnemonic which identifies the source application generating the message. This allows messages to be filtered based on their urgency or relevancy. The message severity determines the set of event logging devices that are sent for each event message. The default severity for all logs is *Informational*, with the exception of logs in the Remote Log Server, which are *Error*.

The following table lists the available system log severity levels and the corresponding messages:

Table 3: System Log Severity Levels

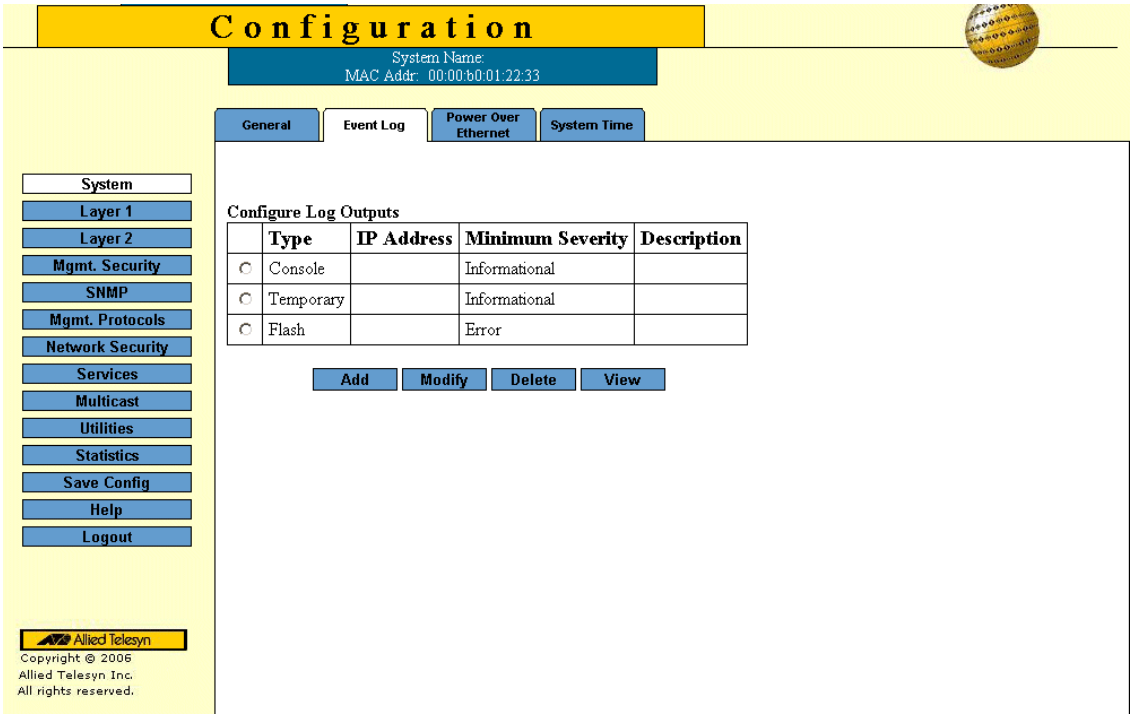
Severity	Level	Description	Message
Emergency	0	The highest warning level. If the device is down or not functioning properly, an emergency log message is saved to the specified logging location.	The system is not functioning.
Alert	1	The second highest warning level. An alert log is saved if there is a serious device malfunction. For example, all device features are down.	The system needs immediate attention.
Critical	2	The third highest warning level. A critical log is saved if a critical device malfunction occurs. For example, two device ports are not functioning, while the rest of the device ports remain functional	The system is in a critical state.
Error	3	A device error has occurred. For example, a single port is offline.	A system error has occurred.
Warning	4	The lowest level of a device warning. The device is functioning, but an operational problem has occurred.	A system warning has occurred.
Notice	5	The system is functioning properly, but a system notice has occurred.	The system is functioning properly, but a system notice has occurred.
Informational	6	Provides device information.	Provides device information.
Debug	7	Provides detailed information about the log. If a Debug error occurs, contact Customer Tech Support.	Provides detailed information about the log. If a Debug error occurs, contact Customer Tech Support.

The *Event Log Page* page contains fields for defining which events are recorded to which logs. It contains fields for enabling logs globally and parameters for defining logs.

To define system log parameters:

1. Click **System > Event Log**. The *Event Log Page* opens:

Figure 50: Event Log Page



The *Event Log Page* contains the following fields:

- **Minimum Severity** — Indicates the minimum severity level to be included in the log output. All logs that have the severity higher than the minimum severity are also included in the output. When the minimum severity level is defined, logs of all higher severity levels are selected automatically.
  - *Disable* — Disables minimum severity.
  - *Enable* — Enables minimum severity.

The *Log Outputs* table displays the following log information:

- **Type** — Indicates the log type included in the output. The possible values are:
  - *Console* — Indicates that the output is of a console log.
  - *Temporary* — Indicates that the output is of the temporary memory log.
  - *Syslog* — Indicates that the output is of a a system log.
  - Flash — Indicates that the output is of a Flash memory log.
- **IP Address** — Displays the defined IP address of the syslog server.
- **Minimum Severity** — Indicates the defined minimum severity level.

- **Description** — Provides additional information about the syslog server.

2. Define the Minimum Severity for the log.
3. Click **Apply**. Logging is enabled on the device.

Clearing Event Logs

To clear all events from the log:

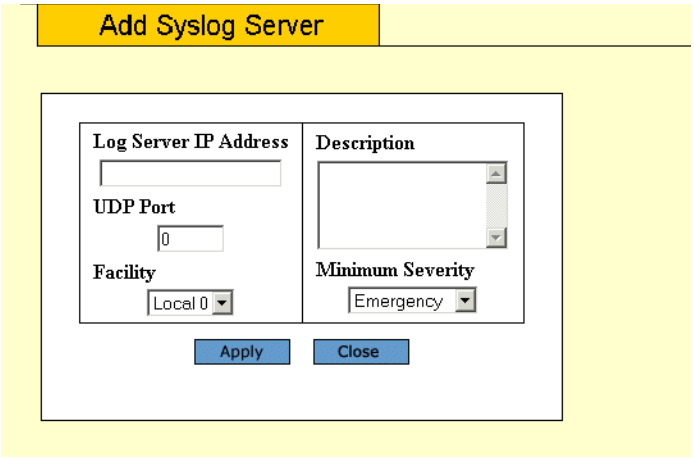
1. Click **System > Event Log**. The *Event Log Page* opens:
2. Click **Clear Logs**. The stored logs are cleared. If logging is enabled, the system begins to log new events.

Configuring Log Servers

To add a log server:

1. Click **System > Event Log**. The *Event Log Page* opens.
2. Select a Log *Type* in the Configure Log Outputs table'
3. Click **Create**. The *Add Syslog Server Page* opens:

Figure 51: Add Syslog Server Page



The *Add Syslog Server Page* contains the following fields:

- **Log Server IP Address** — Defines the IP address of the syslog server.
- **UDP Port** — Defines the UDP port to which the server logs are sent. The possible range is 1-65535. The default value is 514.
- **Facility** — Defines an application from which system logs are sent to the remote server. Only one facility can be assigned to a single server. If a second facility level is assigned, the first facility is overridden. All applications defined for a device utilize the same facility on a server. The field default is Local 7. The possible field values are Local 0 - Local 7.
- **Description** — Provides any additional information about the syslog server, for example its location.
- **Minimum Severity** — Indicates the minimum severity level to be included in the log output. All logs that have the severity higher than the minimum severity are also included in the output. When the minimum severity level is defined, logs of all higher severity levels are selected automatically.

4. Define the *IP Address*, *UDP Port*, *Facility*, *Description*, and *Minimum Severity* fields.
5. Click **Apply**. The Log server is defined and the device is updated.

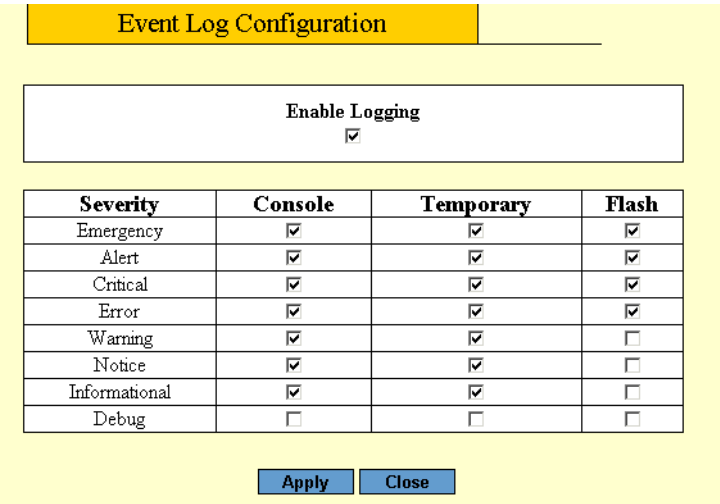
Setting System Log Display

The *Modify Event Log Output Page* contains options to set output parameters for system logs.

To configure log output properties:

1. Click **System > Event Log**. The *Event Log Page* opens.
2. Select a Log *Type* in the Configure Log Outputs table.
3. Click **Modify**. The *Modify Event Log Output Page* opens:

Figure 52: Modify Event Log Output Page



The following fields are displayed in the *Modify Event Log Output Page*:

- **Enable Logging** — Defines if logging is enabled. Possible values are:
  - *Checked* — Logging is enabled on the device.
  - *Unchecked* — Logging is disabled on the device.
- **Severity** — Indicates the event severity to trigger a log. Log severities are listed from highest to lowest severity. See Table 3, "System Log Severity Levels," on page 83.
- **Console** — Indicates that the output is of a Console log.
- **Memory Logs** — Indicates that the output is of a Memory log.
- **Log Flash** — Indicates that the output is of a Flash log.

4. Check the **Enable Logging** option.
5. Map the log output severities to log types in the *Console*, *Memory Logs* and *Log Flash* columns. Checking all Includes all severity levels in the log
6. Click **Apply**. The output settings are saved and the device is updated.
7. Click **Save Config** in the *Event Log Page* menu to save the changes permanently.

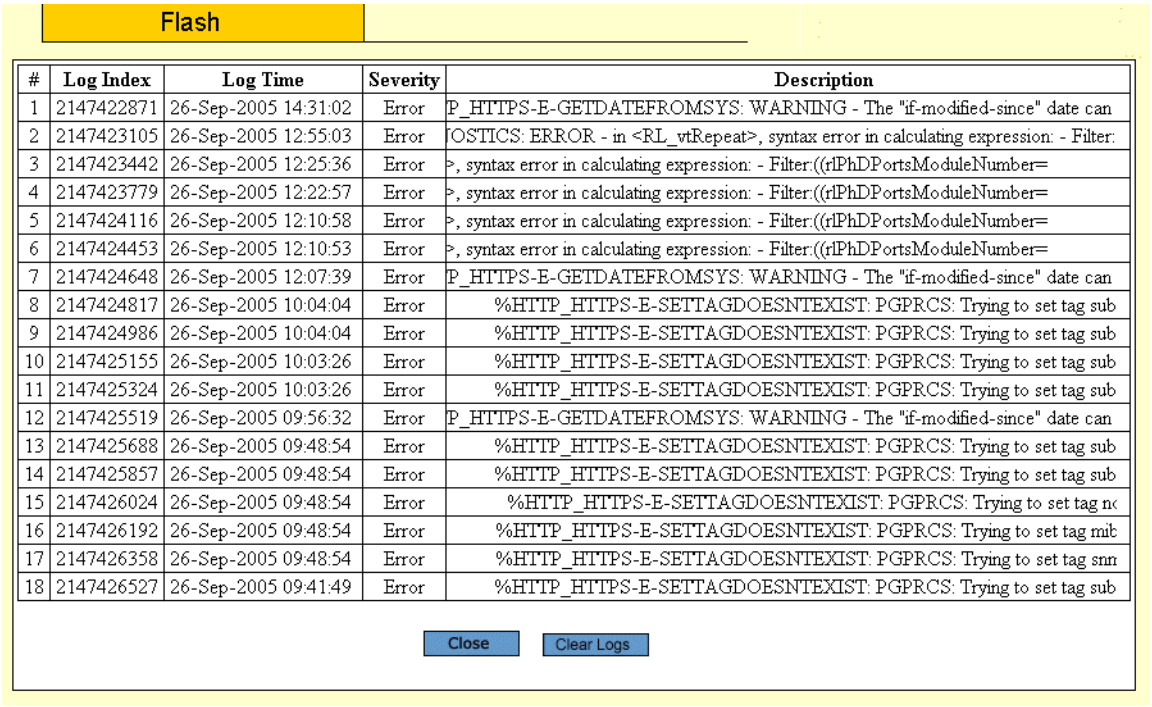
Viewing Flash Logs

The Syslog Flash Page contains information about log entries saved to the log file in Flash, including the time the log was generated, the log severity, and a description of the log message. The message log is available after reboot.

To display Flash logs:

1. Click **System > Event Log**. The *Event Log Page* opens:
2. Click **View Flash.** The *Flash Log Page* opens:

Figure 53: Flash Log Page



The *Flash Log Page* lists the following information:

- **Log Index** — Lists the log index number.
- **Log Time** — Lists the date and time that the log was entered.
- **Severity** — Lists the severity of the event for which the log was created in Flash memory.
- **Description** — Lists the event details.

To clear Flash memory logs:

1. Click **Clear Logs**. Logs are removed from the table.
2. Click **Close**. The *Event Log Page* is displayed.

Section 8. Configuring Spanning Tree

Spanning Tree Protocol (STP) provides tree topography for any arrangement of bridges. STP also provides a single path between end stations on a network, eliminating loops.

Loops occur when alternate routes exist between hosts. Loops in an extended network can cause bridges to forward traffic indefinitely, resulting in increased traffic and reducing network efficiency.

The device supports the following STP versions:

- **Classic STP** — Provides a single path between end stations, avoiding and eliminating loops. For more information on configuring Classic STP, see *Configuring Classic Spanning Tree*.
- **Rapid STP** — Detects and uses network topologies that provide faster convergence of the spanning tree, without creating forwarding loops. For more information on configuring Rapid STP, see *Configuring Rapid Spanning Tree*.
- **Multiple STP** — Provides various load balancing scenarios. For example, if port A is blocked in one STP instance, the same port can be placed in the *Forwarding State* in another STP instance. For more information on configuring Multiple STP, see *Configuring Multiple Spanning Tree*.

This section contains the following topics:

- Configuring Classic Spanning Tree
- Defining STP Interfaces
- Configuring Rapid Spanning Tree
- Configuring Multiple Spanning Tree

Configuring Classic Spanning Tree

This section contains the following topics:

- Defining STP Properties
- Defining STP Interfaces

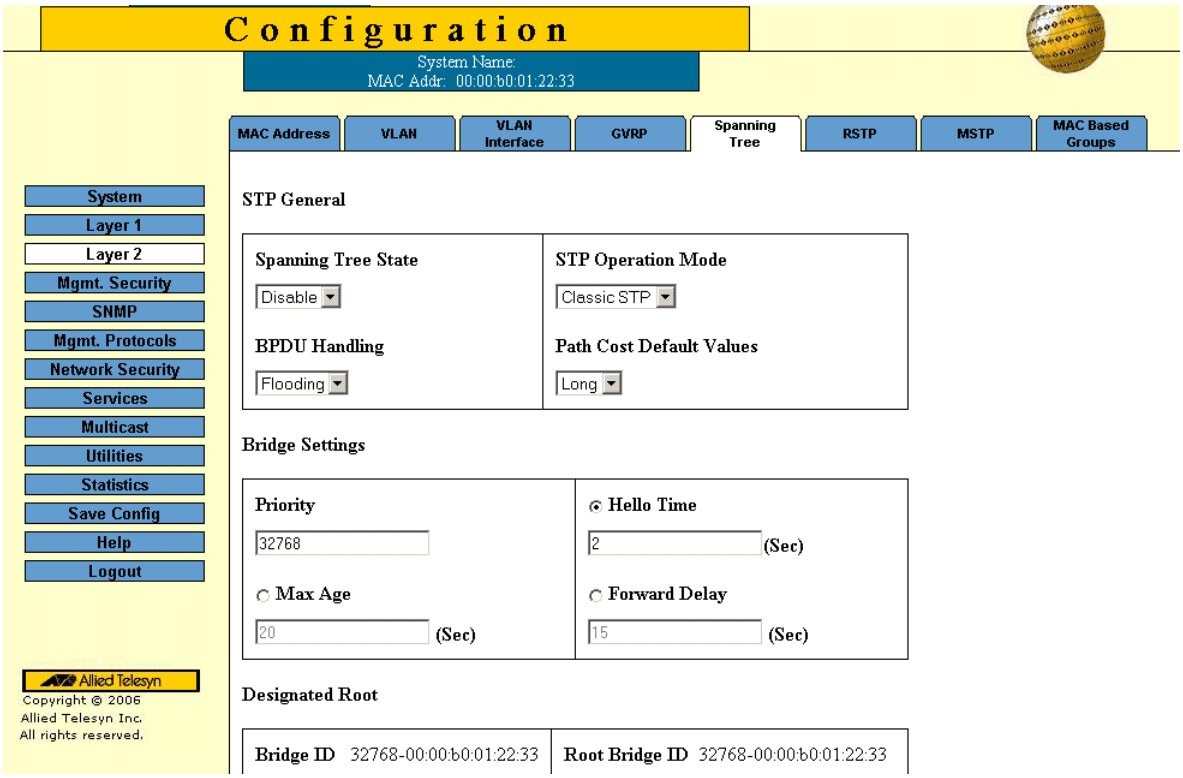
Defining STP Properties

The *Spanning Tree Page* contains parameters for enabling and configuring STP on the device.

To enable STP on the device:

1. Click **Layer 2 > Spanning Tree (STP)**. The *Spanning Tree Page* opens:

Figure 54: Spanning Tree Page



The *STP General* section of the *Spanning Tree Page* contains the following fields:

- **Spanning Tree State** — Indicates whether STP is enabled on the device. The possible field values are:
  - *Enable* — Enables STP on the device.
  - *Disable* — Disables STP on the device.
- **STP Operation Mode** — Specifies the STP mode that is enabled on the device. The possible field values are:
  - *Classic STP* — Enables Classic STP on the device. This is the default value.
  - *Rapid STP* — Enables Rapid STP on the device.

  - *Multiple STP* — Enables Multiple STP on the device.

- **BPDU Handling** — Determines how BPDU packets are managed when STP is disabled on the port or device. BPDUs are used to transmit spanning tree information. The possible field values are:
  - *Filtering* — Filters BPDU packets when spanning tree is disabled on an interface.
  - *Flooding* — Floods BPDU packets when spanning tree is disabled on an interface. This is the default value.
- **Path Cost Default Values** — Specifies the method used to assign default path cost to STP ports. The possible field values are:
  - *Short* — Specifies 1 through 65,535 range for port path cost.
  - *Long* — Specifies 1 through 200,000,000 range for port path cost. This is the default value.

The *Bridge Settings* section of the *Spanning Tree Page* contains the following fields:

- **Priority** — Specifies the bridge priority value. When switches or bridges are running STP, each is assigned a priority. After exchanging BPDUs, the device with the lowest priority value becomes the Root Bridge. The default value is 32768. The port priority value is provided in increments of 4096; the value range is 0-65535.
- **Hello Time** — Specifies the device Hello Time, in seconds. The Hello Time is the time interval during which a Root Bridge waits between configuration messages. The value range is 1-10 seconds; the default value is 2 seconds.
- **Max Age** — Specifies the device Maximum Age Time, in seconds. The Maximum Age Time is the time interval during which a bridge waits before sending configuration messages. The value range is 6-40 seconds; the default value is 20 seconds.
- **Forward Delay** — Specifies the device Forward Delay Time, in seconds. The Forward Delay Time is the time interval during which a bridge remains in the listening-and-learning state before forwarding packets. The value range is 4-30 seconds; the default value is 15 seconds.

The *Designated Root* section of the *Spanning Tree Page* contains the following fields:

- **Bridge ID** — Identifies the Bridge priority and MAC address.
- **Root Bridge ID** — Identifies the Root Bridge priority and MAC address.
- **Root Port** — Indicates the port number that offers the lowest cost path from this bridge to the Root Bridge. This field is significant when the bridge is not the Root Bridge. The default is zero.
- **Root Path Cost** — The cost of the path from this bridge to the Root Bridge.
- **Topology Changes Counts** — Specifies the total amount of STP state changes that have occurred.
- **Last Topology Change** — Indicates the time interval that has elapsed since the bridge was initialized or reset, and the last topographic change that occurred. The time is displayed in a day-hour-minute-second format, such as 2 days 5 hours 10 minutes and 4 seconds.

2. Complete the *Spanning Tree State* and *Bridge Settings* fields.
3. Click **Apply**. The new STP definition is added and device information is updated.
4. Click **Save Config** on the menu to save the settings permanently.

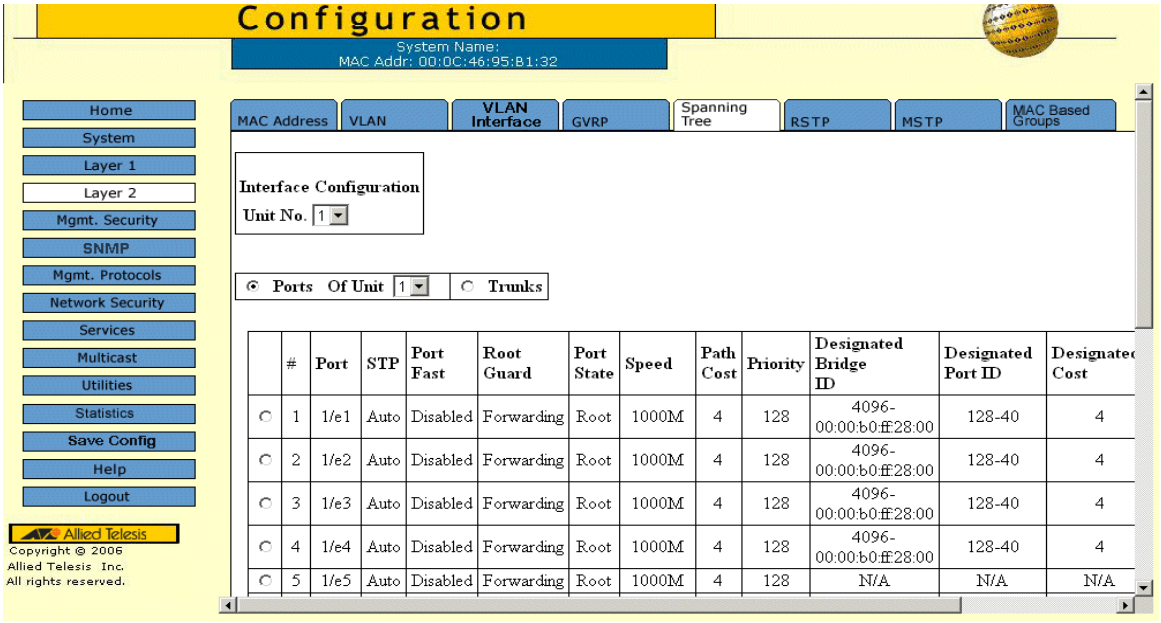
Defining STP Interfaces

Network administrators can assign STP settings to a specific interface (port or LAG) using the *STP Interface Configuration Page*. The Global LAGs section displays the STP information for Link Aggregated Groups.

To assign STP settings to an interface (port or LAG):

1. Click **Layer 2 > Spanning Tree**. The *Spanning Tree Page* opens.
2. Click **Configure**. The *STP Interface Configuration Page* opens:

Figure 55: STP Interface Configuration Page



The *STP Interface Configuration Page* contains the following sections:

- Interface Configuration
- STP Port Parameters table
- Global System LAGs table

The parameters listed in both tables are identical.

The *STP Interface Configuration Page* contains the following fields:

- **Unit Number** — Indicates the stacking member for which the STP information is displayed.
- **Port** — Displays the port or LAG on which STP is enabled.
- **STP Status** — Indicates if STP is enabled on the port. The possible field values are:
  - *Enabled* — Indicates that STP is enabled on the port.
  - *Disabled* — Indicates that STP is disabled on the port.
- **Port Fast** — Indicates if Fast Link is enabled on the port. If Fast Link mode is enabled for a port, the *Port State* is automatically placed in the *Forwarding* state when the port link is up. Fast Link optimizes the STP protocol convergence. STP convergence can take 30-60 seconds in large networks.
- **Root Guard** — Prevents devices outside the network core from being assigned the spanning tree root.
- **Port State** — Displays the current STP state of a port. If enabled, the port state determines what forwarding

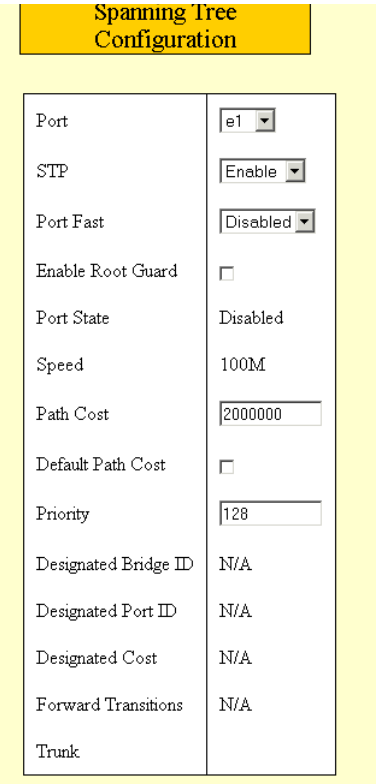
action is taken on traffic. Possible port states are:

  - *Disabled* — Indicates that STP is currently disabled on the port. The port forwards traffic while learning MAC addresses.
  - *Blocking* — Indicates that the port is currently blocked and cannot forward traffic or learn MAC addresses. Blocking is displayed when Classic STP is enabled.

- **Speed** — Indicates the speed at which the port is operating.
- **Path Cost** — Indicates the port contribution to the root path cost. The path cost is adjusted to a higher or lower value, and is used to forward traffic when a path is rerouted.
- **Priority** — Indicates the priority value of the port. The priority value influences the port choice when a bridge has two ports connected in a loop. The priority value is between 0-240. The priority value is determined in increments of 16.
- **Designated Bridge ID** — Indicates the bridge priority and the MAC Address of the designated bridge.
- **Designated Port ID** — Indicates the selected port priority and interface.
- **Designated Cost** — Indicates the cost of the port participating in the STP topology. Ports with a lower cost are less likely to be blocked if STP detects loops.
- **Forward Transitions** — Indicates the number of times the port has changed from *Forwarding* state to *Blocking* state.
- **LAG** — Indicates the LAG to which the port belongs.

3. Select the Unit, in the STP Interface Configuration section.
4. Click **Modify**. The *STP Modify Interface Configuration Page* opens:

Figure 56: STP Modify Interface Configuration Page



5. Select *Enable* in the *STP* field.
6. Define the *Port Fast*, *Enable Root Guard*, *Path Cost*, *Default Path Cost*, and *Priority* fields.
7. Click **Apply**. STP is enabled on the interface, and the device is updated.

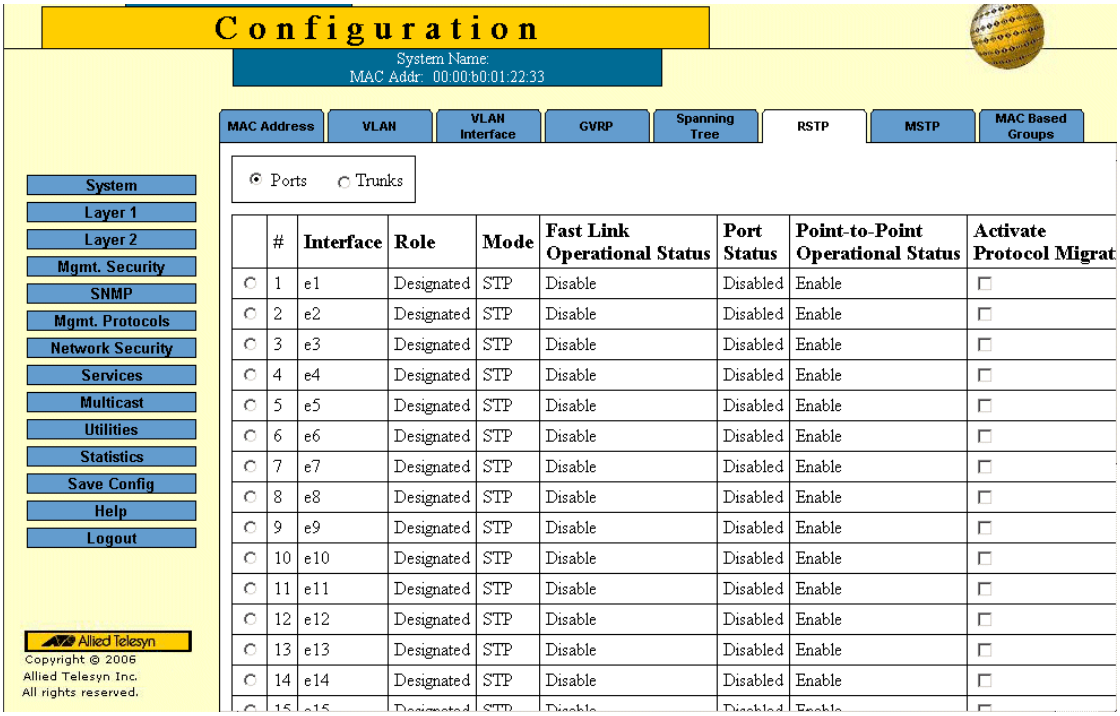
Configuring Rapid Spanning Tree

While Classic STP prevents Layer 2 forwarding loops in a general network topology, convergence can take between 30-60 seconds. This time may delay detecting possible loops and propagating status topology changes. *Rapid Spanning Tree Protocol* (RSTP) detects and uses network topologies that allow a faster STP convergence without creating forwarding loops. The Global System LAG information displays the same field information as the ports, but represent the LAG RSTP information.

To define RSTP on the device:

1. Click **Layer 2 > RSTP**. The *RSTP Page* opens:

Figure 57: RSTP Page



	#	Interface	Role	Mode	Fast Link Operational Status	Port Status	Point-to-Point Operational Status	Activate Protocol Migrat
○	1	e1	Designated	STP	Disable	Disabled	Enable	☐
○	2	e2	Designated	STP	Disable	Disabled	Enable	☐
○	3	e3	Designated	STP	Disable	Disabled	Enable	☐
○	4	e4	Designated	STP	Disable	Disabled	Enable	☐
○	5	e5	Designated	STP	Disable	Disabled	Enable	☐
○	6	e6	Designated	STP	Disable	Disabled	Enable	☐
○	7	e7	Designated	STP	Disable	Disabled	Enable	☐
○	8	e8	Designated	STP	Disable	Disabled	Enable	☐
○	9	e9	Designated	STP	Disable	Disabled	Enable	☐
○	10	e10	Designated	STP	Disable	Disabled	Enable	☐
○	11	e11	Designated	STP	Disable	Disabled	Enable	☐
○	12	e12	Designated	STP	Disable	Disabled	Enable	☐
○	13	e13	Designated	STP	Disable	Disabled	Enable	☐
○	14	e14	Designated	STP	Disable	Disabled	Enable	☐

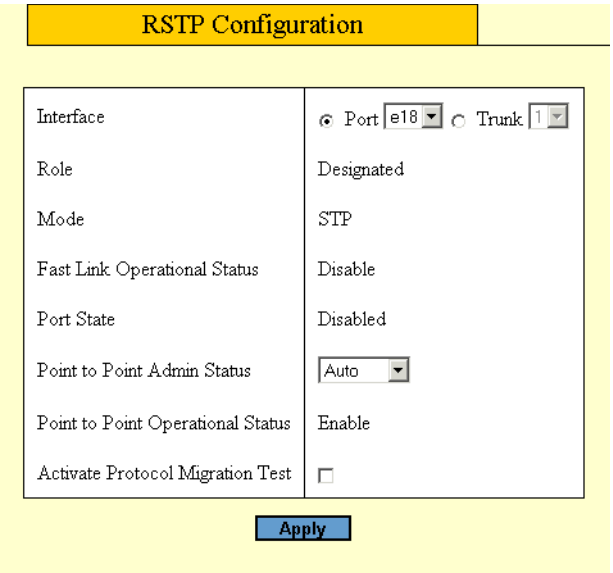
The *RSTP Page* contains the following fields:

- **Unit Number** — Indicates the stacking member for which the Rapid STP information is displayed.
- **Interface** — Displays the port or LAG on which Rapid STP is enabled.
- **State** — Indicates if
- **Role** — Displays the port role assigned by the STP algorithm to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to the root switch.
  - *Designated* — The port or LAG through which the designated switch is attached to the LAN.
  - *Alternate* — Provides an alternate path to the root switch from the root interface.

  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link, or when a LAN has two or more connections to a shared segment.
  - *Disabled* — The port is not participating in the Spanning Tree.
- **Mode** — Displays the current STP mode. The STP mode is selected in the *Spanning Tree Page*. The possible field values are:
  - *STP* — Classic STP is enabled on the device.
  - *Rapid STP* — Rapid STP is enabled on the device.
  - *Multiple STP* — Multiple STP is enabled on the device.
- **Fast Link Operational Status** — Indicates whether Fast Link is enabled or disabled for the port or LAG. If Fast Link is enabled for a port, the port is automatically placed in the forwarding state.
- **Point-to-Point Admin Status** — Indicates whether a point-to-point link is established, or if the device is permitted to establish a point-to-point link. The possible field values are:
  - *Enable* — The device is permitted to establish a point-to-point link, or is configured to automatically establish a point-to-point link. To establish communications over a point-to-point link, the originating PPP first sends *Link Control Protocol* (LCP) packets to configure and test the data link. After a link is established and optional facilities are negotiated as needed by the LCP, the originating PPP sends *Network Control Protocol* (NCP) packets to select and configure one or more network layer protocols. When each of the chosen network layer protocols has been configured, packets from each network layer protocol can be sent over the link. The link remains configured for communications until explicit LCP or NCP packets close the link, or until some external event occurs. This is the actual switch port link type. It may differ from the administrative state.
  - *Disable* — Disables point-to-point link.
- **Point-to-Point Operational Status** — Displays the point-to-point operating state.

2. Click **Modify**. The *Modify RSTP Page* opens:

Figure 58: Modify RSTP Page



3. Define the *STP*, *Fast Link, Enable Root Guard*, *Port State Path Cost*, *Default Path Cost* and *Priority* fields.
4. Click **Apply**. RSTP is defined for the selected interface, and the device is updated.
5. Click **Save Config** on the menu, to save changes permanently.

Configuring Multiple Spanning Tree

Multiple Spanning Tree Protocol (MSTP) provides differing load balancing scenarios. For example, while port A is blocked in one STP instance, the same port can be placed in the *Forwarding* state in another STP instance. The *MSTP Page* contains information for defining global MSTP settings, including region names, MSTP revisions, and maximum hops.

This section contains the following topics:

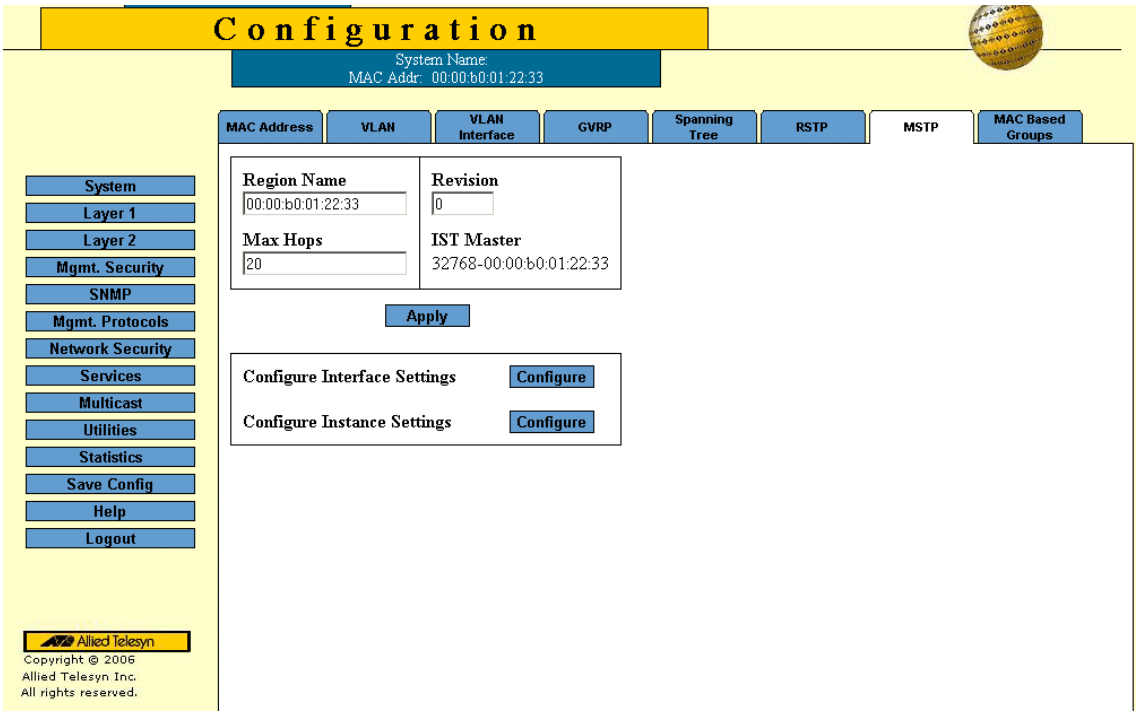
- Defining MSTP Properties
- Defining MSTP Interfaces
- Defining MSTP Instances

Defining MSTP Properties

To define MSTP:

1. Click **Layer 2 > MSTP**. The *MSTP Page* opens:

Figure 59: MSTP Page



The *MSTP Page* contains the following fields:

- **Region Name** — User-defined STP region name.
- **Revision** — An unsigned 16-bit number that identifies the revision of the current MSTP configuration. The revision number is required as part of the MSTP configuration. The possible field range is 0-65535.
- **Max Hops** — Specifies the total number of hops that occur in a specific region before the BPDU is discarded. Once the BPDU is discarded, the port information is aged out. The possible field range is 1-40. The field default is 20 hops.
- **IST Master** — Identifies the Spanning Tree Master instance. The IST Master is the specified instance root.

2. Define the *Region Name*, *Revision*, and *Max Hops* fields.
3. Click **Apply**. The MSTP properties are defined, and the device is updated.

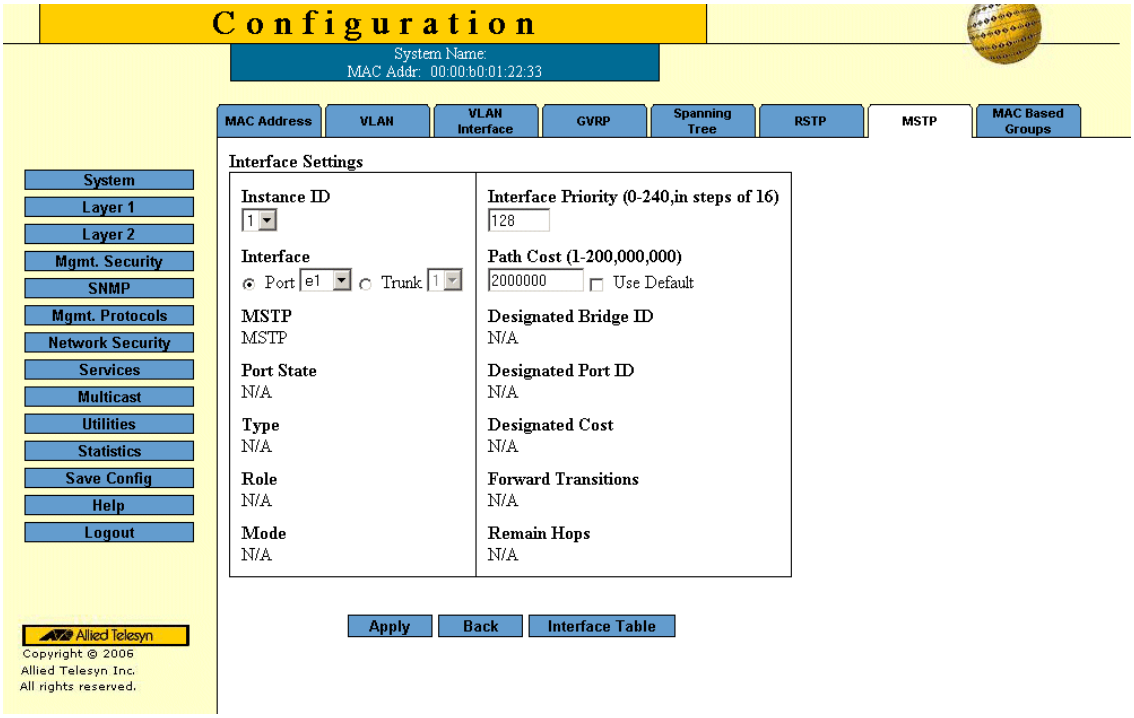
Defining MSTP Interfaces

Network administrators can assign MSTP settings to a specific interface (port or LAG) using the *MSTP Interface Settings Page*.

To define MSTP interface settings:

1. Click **Layer 2 > MSTP**. The *MSTP Page* opens.
2. Click **Configure** next to the *Configure Interface Settings* option. The *MSTP Interface Settings Page* opens:

Figure 60: MSTP Interface Settings Page



The *MSTP Interface Settings Page* contains the following fields:

- **Instance ID** — Lists the MSTP instances configured on the device. The possible field range is 0-7.
- **Interface Priority** — Defines the interface priority for the specified instance. The default value is 128.
- **Interface** — Displays the interface for which the MSTP settings are displayed. The possible field values are:
  - *Port of Unit* — Specifies the port for which the MSTP settings are displayed.
  - *LAG* — Specifies the LAG for which the MSTP settings are displayed.
- **Path Cost** — Indicates the port contribution to the Spanning Tree instance. The field range is 1-200,000,000.
- **MSTP** — Specifies whether or not MSTP is enabled on the interface. The possible field values are:
  - *Enable* — Enables MSTP on the interface.
  - *Disable* — Disables MSTP on the interface.
- **Port State** — Indicates whether the port is enabled for the specific instance. The possible field values are:
  - *Enable* — Enables the port for the specific instance.

  - *Disable* — Disables the port for the specific instance.
- **Type** — Indicates whether the port is a Boundary or Master port. The possible field values are:
  - *Boundary Port* — Indicates that the port is a Boundary port. A Boundary port attaches MST bridges to LANs in an outlying region. If the port is a Boundary port, this field also indicates whether the device on the other side of the link is working in RSTP or STP mode.
  - *Master Port* — Indicates the port is a master port. A Master port provides connectivity from an MSTP region to the outlying CIST root.
- **Role** — Indicates the port role assigned by the STP algorithm to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to the root device.
  - *Designated* — Indicates the port or LAG through which the designated device is attached to the LAN.
  - *Alternate* — Provides an alternate path to the root device from the root interface.
  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link or when a LAN has two or more connections to a shared segment.
  - *Disabled* — Indicates the port is not participating in the Spanning Tree.
- **Mode** — Indicates the STP mode by which STP is enabled on the device. The possible field values are:
  - *Classic STP* — Classic STP is enabled on the device. This is the default value.
  - *Rapid STP* — Rapid STP is enabled on the device.
  - *Multiple STP* — Multiple STP is enabled on the device.
- **Designated Bridge ID** — Displays the ID of the bridge that connects the link or shared LAN to the root.
- **Designated Port ID** — Displays the ID of the port on the designated bridge that connects the link or the shared LAN to the root.
- **Designated Cost** — Indicates that the default path cost is assigned according to the method selected on the Spanning Tree Global Settings.
- **Forward Transitions** — Indicates the number of times the LAG State has changed from a *Forwarding* state to a *Blocking* state.
- **Remain Hops** — Indicates the hops remaining to the next destination.

3. Define the fields.
4. Click **Apply**. MSTP is defined for the selected interface, and the device is updated. The *MSTP Page* is displayed.
5. Click **Save Config** on the menu, to save changes permanently.

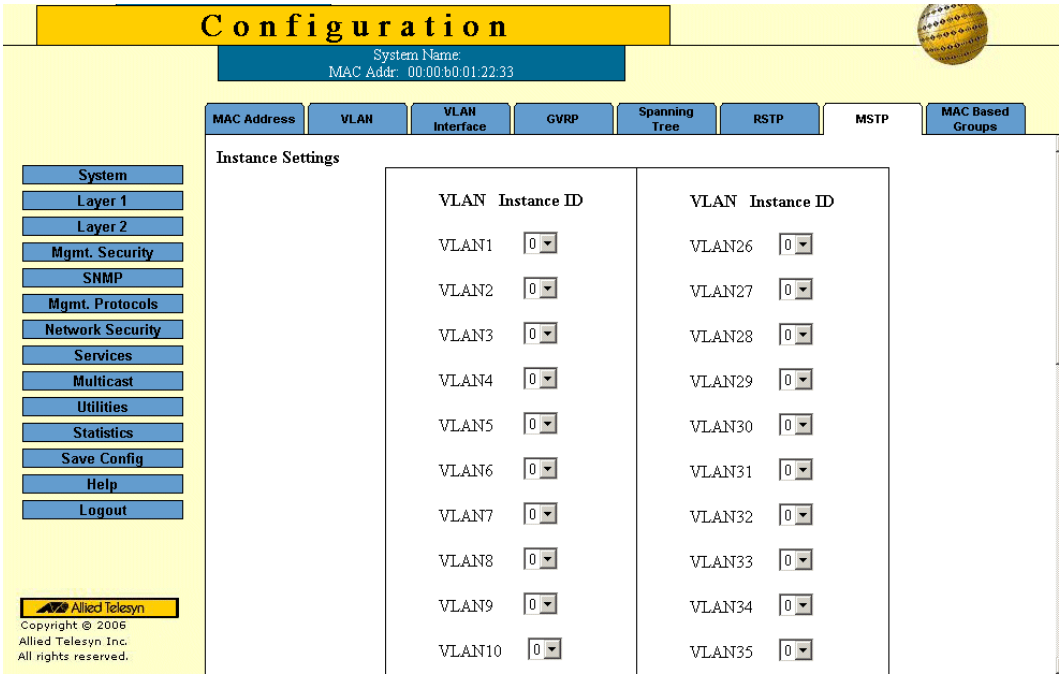
Defining MSTP Instances

Network administrators can assign MSTP settings to a specific instance (port or LAG) using the *MSTP Instance Settings Page*.

To define MSTP interface settings:

1. Click **Layer 2 > MSTP**. The *MSTP Page* opens.
2. Click **Configure** next to the *Configure Instance Settings* option. The *MSTP Instance Settings Page* opens:

Figure 61: MSTP Instance Settings Page



The *MSTP Interface Settings Page* contains the following fields:

- **VLAN** — Displays the VLAN ID.
- **Instance ID** — Configures the MSTP instances. The possible field range is 0-7.

3. Map the VLANs to Instance IDs.
4. Click **Save Config** on the menu, to save changes permanently.

Section 9. Configuring Multicast Forwarding

Multicast forwarding allows a single packet to be forwarded to multiple destinations. Layer 2 Multicast service is based on a Layer 2 switch receiving a single packet addressed to a specific multicast address. Multicast forwarding creates copies of the packet, and transmits the packets to the relevant ports. The Internet Group Management Protocol (IGMP) allows hosts to notify their local switch or router that they want to receive transmissions assigned to a specific multicast group.

This section describes the configuration of IGMP Snooping. When IGMP Snooping is enabled globally, all IGMP packets are forwarded to the CPU. The CPU analyzes the incoming packets and determines:

- Which ports have Multicast routers generating IGMP queries
- Which ports want to join which Multicast groups
- Which routing protocols are forwarding packets and Multicast traffic.

Ports requesting to join a specific Multicast group issue an IGMP report, specifying that Multicast group is accepting members. This results in the creation of the Multicast filtering database.

Multicast forwarding enables transmitting packets from either a specific multicast group to a source, or from a non-specific source to a Multicast group.

This section contains the following topics:

- Configuring IGMP Snooping
- Defining Multicast Bridging Groups
- Defining Multicast Forward All Settings

Configuring IGMP Snooping

When IGMP Snooping is enabled globally, all IGMP packets are forwarded to the CPU. The CPU analyzes the incoming packets and determines:

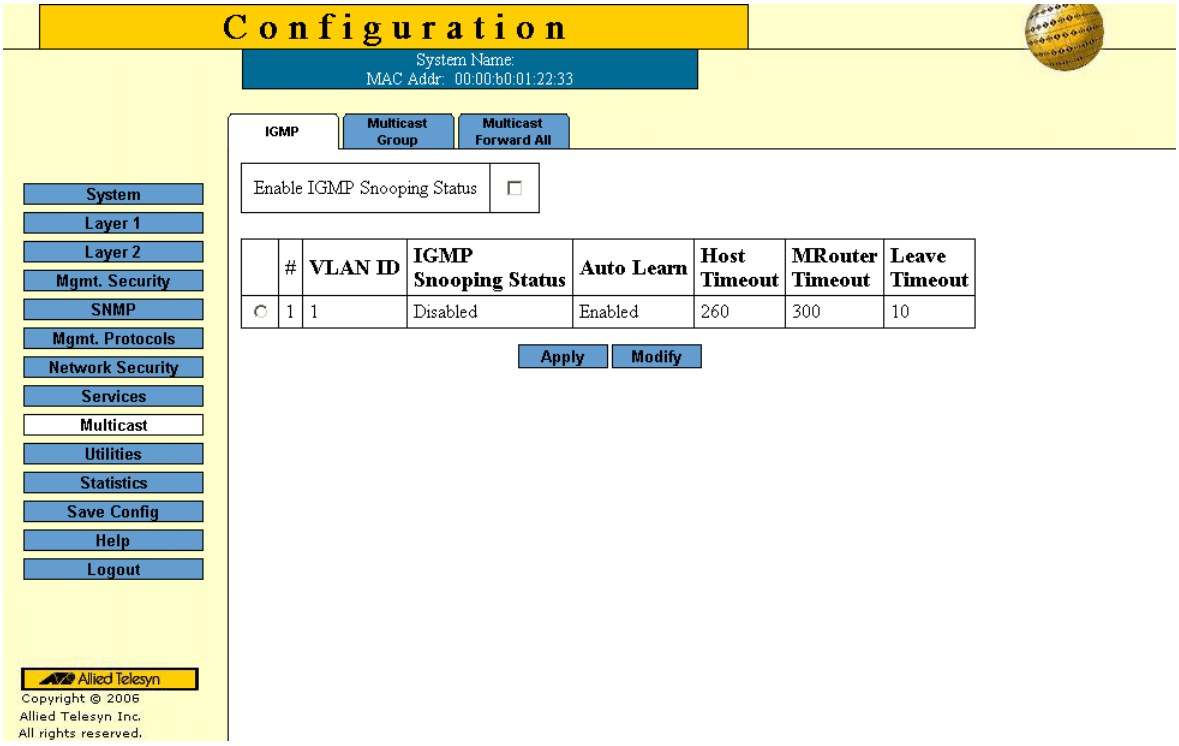
- Which ports want to join which Multicast groups.
- Which ports have Multicast routers generating IGMP queries.
- Which routing protocols are forwarding packets and Multicast traffic.

Ports requesting to join a specific Multicast group issue an IGMP report, specifying that Multicast group is accepting members. This results in the creation of the Multicast filtering database.

To configure IGMP Snooping:

1. Click **Multicast** > **IGMP**. The *IGMP Page* opens:

Figure 62: IGMP Page



The *IGMP Page* contains the following fields:

- **Enable IGMP Snooping Status** — Indicates if IGMP Snooping is enabled on the device. IGMP Snooping can be enabled only if Bridge Multicast Filtering is enabled. The possible field values are:
  - *Checked* — Enables IGMP Snooping on the device.
  - *Unchecked* — Disables IGMP Snooping on the device.
- **VLAN ID** — Specifies the VLAN ID.
- **IGMP Snooping Status** — Indicates if IGMP Snooping is enabled on the VLAN. The possible field values are:

  - *Enable* — Enables IGMP Snooping on the VLAN.
  - *Disable* — Disables IGMP Snooping on the VLAN.

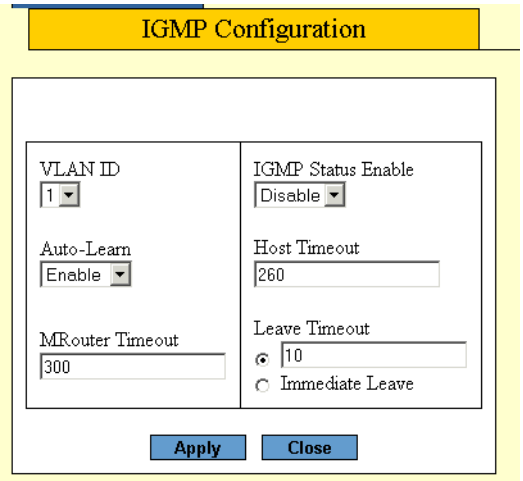
- **Auto Learn** — Indicates if Auto Learn is enabled on the device. If Auto Learn is enabled, the devices automatically learns where other Multicast groups are located. Enables or disables Auto Learn on the Ethernet device.The possible field values are:
  - *Enable* — Enables auto learn
  - *Disable* — Disables auto learn
- **Host Timeout** — Indicates the amount of time host waits to receive a message before timing out. The default time is 260 seconds.
- **MRouter Timeout** — Indicates the amount of the time the Multicast router waits to receive a message before it times out. The default value is 300 seconds.
- **Leave Timeout** — Indicates the amount of time the host waits, after requesting to leave the IGMP group and not receiving a Join message from another station, before timing out. If a Leave Timeout occurs, the switch notifies the Multicast device to stop sending traffic The Leave Timeout value is either user-defined, or an immediate leave value. The default timeout is 10 seconds.

2. Click the *Enable IGMP Snooping Status* checkbox. IGMP Snooping is enabled on the device.

To modify the IGMP Snooping configuration:

1. Click **Multicast** > **IGMP**. The *IGMP Page* opens.
2. Click Modify. The *IGMP Snooping Settings Page* opens:

Figure 63: IGMP Snooping Settings Page



3. Modify the *VLAN ID*, *IGMP Status Enable, Enable Auto Learn*, *Host Timeout*, *MRouter Timeout*, and *Leave Timeout* fields.
4. Click **Apply**. The IGMP Snooping global parameters are modified, and the device is updated.
5. Click **Save Config** on the menu to save the changes permanently.

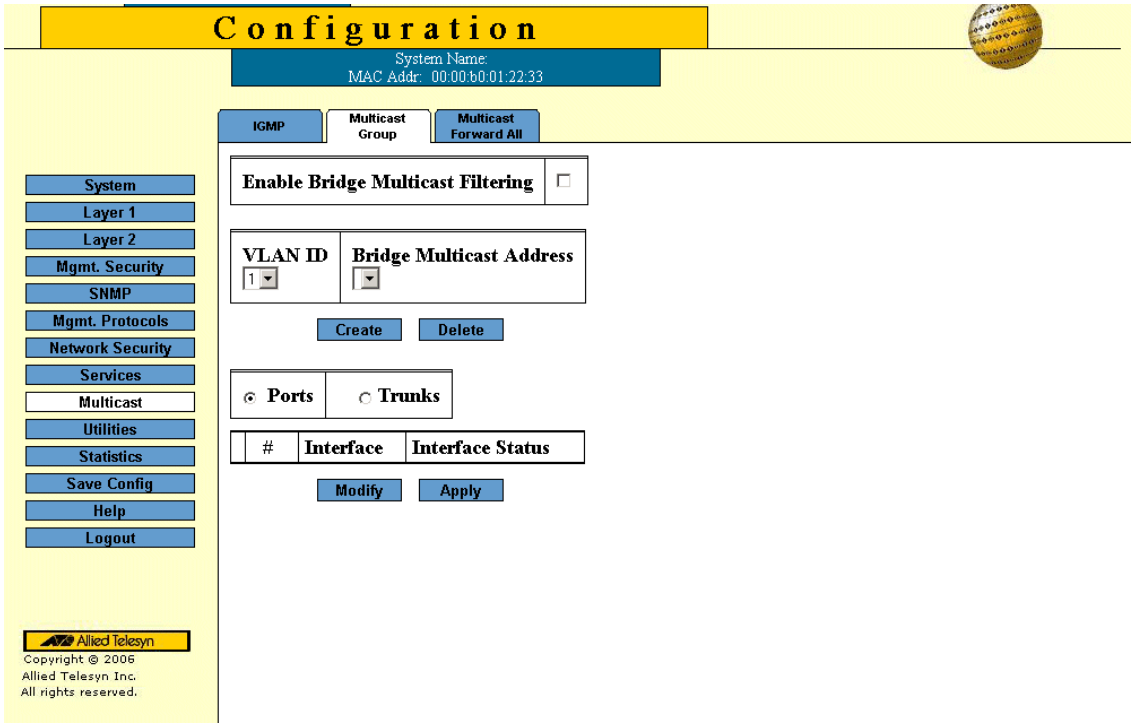
Defining Multicast Bridging Groups

The *Multicast Group Page* displays the ports and LAGs attached to the Multicast service group in the Ports and LAGs tables. The Port and LAG tables also reflect the manner in which the port or LAGs joined the Multicast group. Ports can be added either to existing groups or to new Multicast service groups. New Multicast service groups can be created and ports can be assigned to a specific Multicast service address group.

To define Multicast Groups:

1. Click **Multicast > Multicast Group**. The *Multicast Group Page* opens:

Figure 64: Multicast Group Page



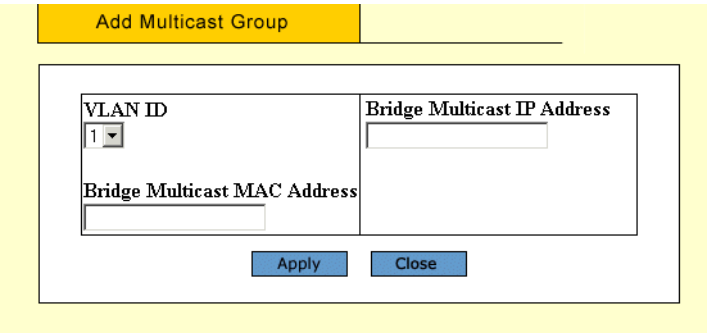
The *Multicast Group Page* contains the following fields:

- **Enable Bridge Multicast Filtering** — Indicates if bridge Multicast filtering is enabled on the device. The possible field values are:
  - *Checked* — Enables Multicast filtering on the device.
  - *Unchecked* — Disables Multicast filtering on the device. If Multicast filtering is disabled, Multicast frames are flooded to all ports in the relevant VLAN. Disabled is the default value.
- **VLAN ID** — Displays the VLAN for which Multicast parameters are displayed.
- **Unit Number**— Identifies a VLAN and contains information about the Multicast group address.
- **Bridge Multicast Address** — Identifies the Multicast group MAC address/IP address.
- **Ports of Unit** — Displays the port that can be added to a Multicast service.
- **Trunks** — Displays the trunk that can be added to a Multicast service.
- **Interface** — Displays the currently defined interface.

- **Interface Status** — Displays the current interface status.

2. Check the **Enable Bridge Multicast Filtering** checkbox.
3. Click **Create**. The *Add Multicast Group Page* opens:

Figure 65: Add Multicast Group Page

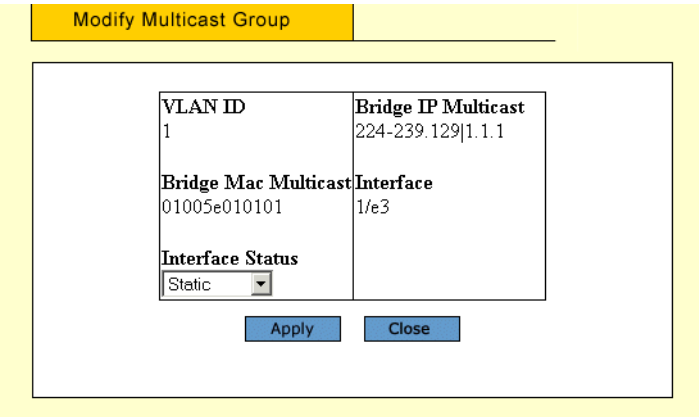


4. Select the *VLAN ID*.
5. Enter the *Bridge Multicast MAC Address* and the *Bridge Multicast IP Address*.
6. Click **Apply**. The new Multicast group is saved and the device is updated.

To modify a multicast group:

Click **Modify**. The *Modify Multicast Group Page* opens:

Figure 66: Modify Multicast Group Page



7. Define the fields.
8. Click **Apply**. The Multicast Group is saved and the device is updated.

Defining Multicast Forward All Settings

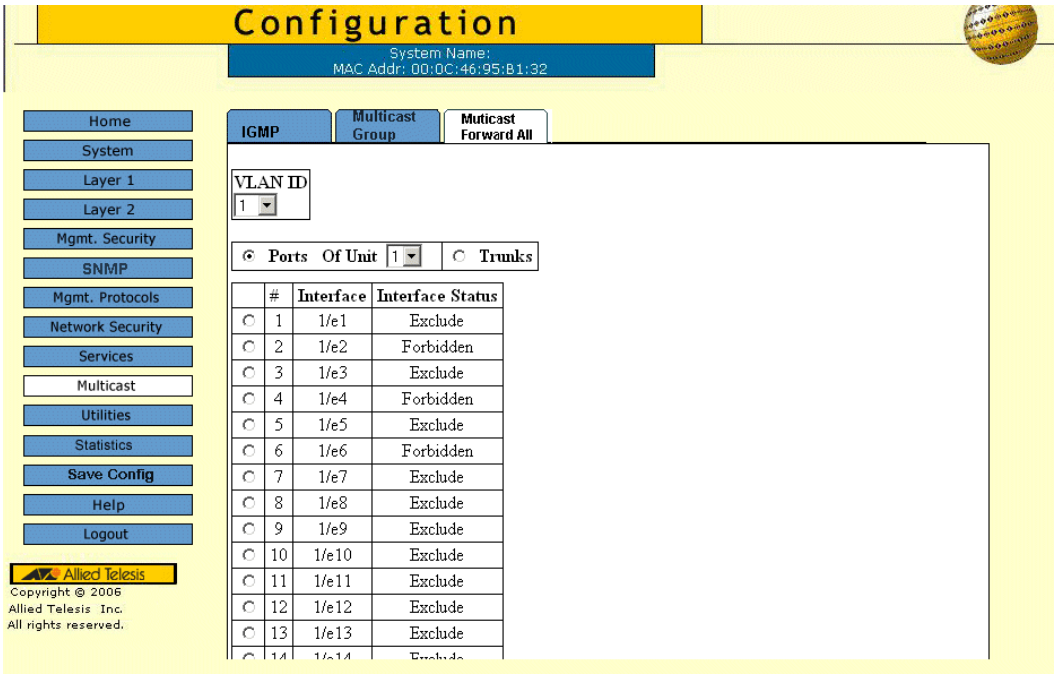
Multicast forwarding enables transmitting packets from either a specific multicast group to a source, or from a non-specific source to a Multicast group.

The Bridge Multicast Forward All page contains fields for attaching ports or LAGs to a device that is attached to a neighboring Multicast router/switch. Once IGMP Snooping is enabled, Multicast packets are forwarded to the appropriate port or VLAN. Unless LAGs are defined, only a Multicast Forward All table displays.

To define Multicast forward all settings:

1. Click **Multicast > Multicast Forward All**. The *Multicast Forward All Page* opens:

Figure 67: Multicast Forward All Page



The *Multicast Forward All Page* contains the following fields:

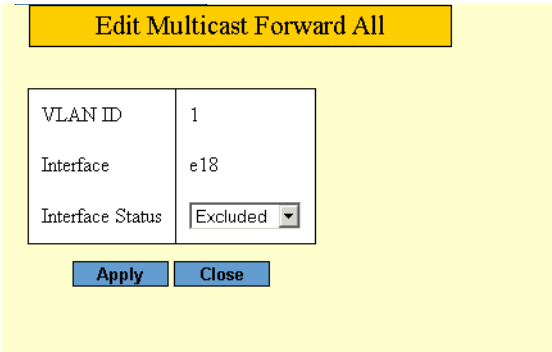
- **VLAN ID** — Displays the VLAN for which Multicast parameters are displayed.
- **Unit Number**— Identifies a VLAN and contains information about the Multicast group address.
- **Ports** —**VLAN ID** — Lists the ports for which Multicast parameters are displayed.
- **Of Unit** — Lists the units for ports that can be added to a Multicast service.
- **Trunks** — Lists the trunks that can be added to a Multicast service.

The Multicast Forward All table displays the following information, identical for ports and trunks.

- **Interface** — Displays the interface ID.
- **Interface Status** — Indicates the forwarding status of the selected interface. The possible values are:
  - *Static* — Attaches the port to the Multicast router or switch as a static port.
  - *None* — The port is not attached to a Multicast router or switch.
  - *Forbidden* — Indicates that the port is forbidden for forward all.
  - *Dynamic* — Attaches the port to the Multicast router or switch as a dynamic port.

2.
3. Select interfaces to modify.
4. Click **Modify**. The *Modify Multicast Forward All Page* opens:

Figure 68: Modify Multicast Forward All Page



5. Define the *Interface Status* field.

Click **Apply**. The Multicast Forward All settings are saved and the device is updated.

Section 10. Configuring SNMP

This section contains the following topics:

- SNMP Overview
- Enabling SNMP
- Defining SNMP Communities
- Defining SNMP Groups
- Defining SNMP Users
- Defining SNMP Views
- Configuring SNMP Notifications

SNMP Overview

Simple Network Management Protocol (SNMP) provides a method for managing network devices. Equipment commonly managed with SNMP includes switches, routers and host computers. SNMP is typically used to configure these devices for proper operation in a network environment, as well as to monitor them to evaluate performance or detect potential problems.

Managed devices supporting SNMP contain software, which runs locally on the device and is referred to as an agent. A defined set of variables, known as managed objects, is maintained by the SNMP agent and used to manage the device. These objects are defined in a Management Information Base (MIB) that provides a standard presentation of the information controlled by the agent. SNMP defines both the format of the MIB specifications and the protocol used to access this information over the network.

The switch includes an onboard agent that supports SNMP versions 1, 2c, and 3. This agent continuously monitors the status of the switch hardware, as well as the traffic passing through its ports. Access to the onboard agent using SNMP v1 and v2c is controlled by community strings. To communicate with the switch, the management station must first submit a valid community string for authentication.

Access to the switch using SNMPv3 provides additional security features that cover message integrity, authentication, and encryption; as well as controlling user access to specific areas of the MIB tree.

The SNMPv3 security structure consists of security models, with each model having its own security levels. There are three security models defined, SNMPv1, SNMPv2c, and SNMPv3. Users are assigned to “groups” that are defined by a security model and specified security levels. Each group also has a defined security access to set of MIB objects for reading and writing, which are known as “views.”

The device has a default view (all MIB objects) and default groups defined for security models v1 and v2c. The following table shows the security models and levels available and the system default settings.

The SNMP agents maintain a list of variables, which are used to manage the device. The variables are defined in the *Management Information Base* (MIB). The SNMP agent defines the MIB specification format, as well as the format used to access the information over the network. Access rights to the SNMP agents are controlled by access strings.

The device is SNMP-compliant and contains an SNMP agent that supports a set of standard and private MIB variables. Developers of management stations require the exact structure of the MIB tree and receive the complete private MIBs information before being able to manage the MIBs.

All parameters are manageable from any SNMP management platform, except the SNMP management station IP address and community (community name and access rights). The SNMP management access to the device is disabled if no community strings exist.

Notes

- The device switch is delivered with no community strings configured.
- The device generates copy traps.

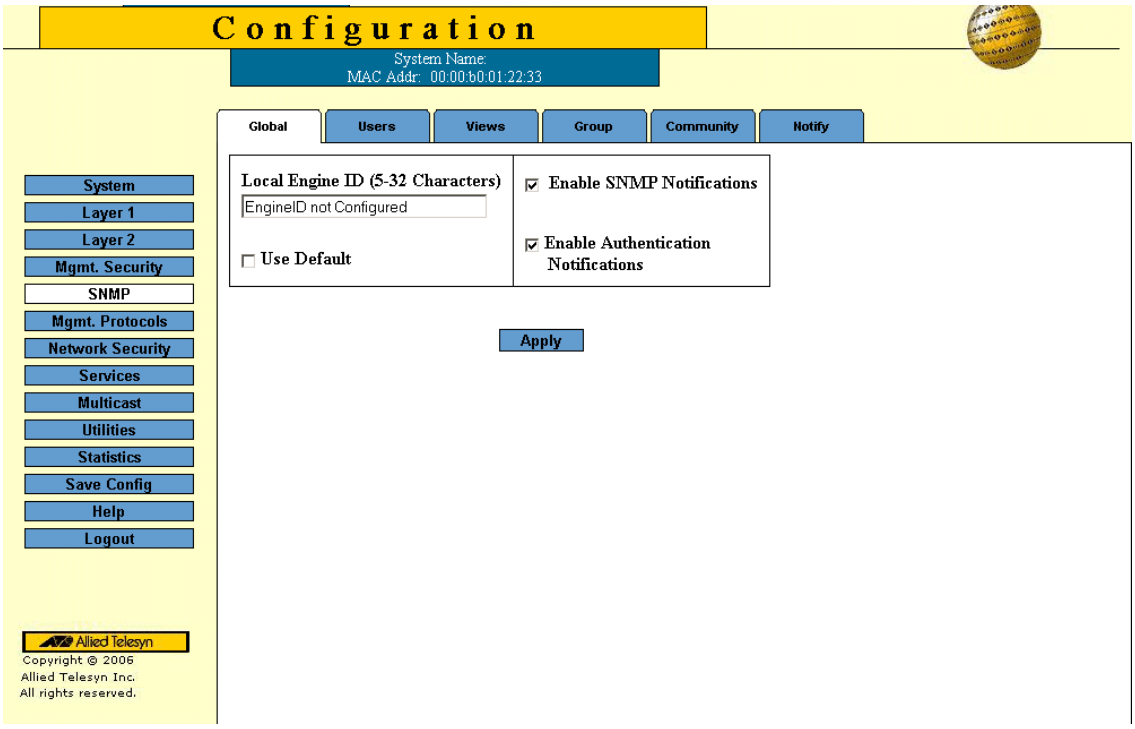
Enabling SNMP

The *SNMP Global Page* provides fields for globally enabling and configuring SNMP on the device.

To enable SNMP:

1. Click **SNMP > Global**. The *SNMP Global Page* opens:

Figure 69: SNMP Global Page



The *SNMP Global Page* contains the following fields:

- **Enable SNMP Access** — Indicates if the protocol is enabled for the device. The possible values are:
  - *Checked* — SNMP is enabled.
  - *Unchecked* — SNMP is disabled.
- **Local Engine ID** (5-32 Characters) — Displays the engine number.
- **Use Defaults** — Restores default SNMP settings.
- **Enable SNMP Notifications** — Indicates if SNMP traps are enabled for the device. The possible values are:
  - *Checked* — Traps are enabled.
  - *Unchecked* — Traps are disabled.
- **Enable Authentication Notifications** — Indicates if authentication error notifications are enabled on the device. The possible values are:
  - *Checked* — Notifications are enabled.
  - *Unchecked* — Notifications are disabled.

2. Define the fields

3. Click **Apply**. The global SNMP settings are saved and the device is updated.

Defining SNMP Communities

Access rights are managed by defining communities in the *SNMP Community Page*. When the community names are changed, access rights are also changed. SNMP communities are defined only for SNMP v1 and SNMP v2c.

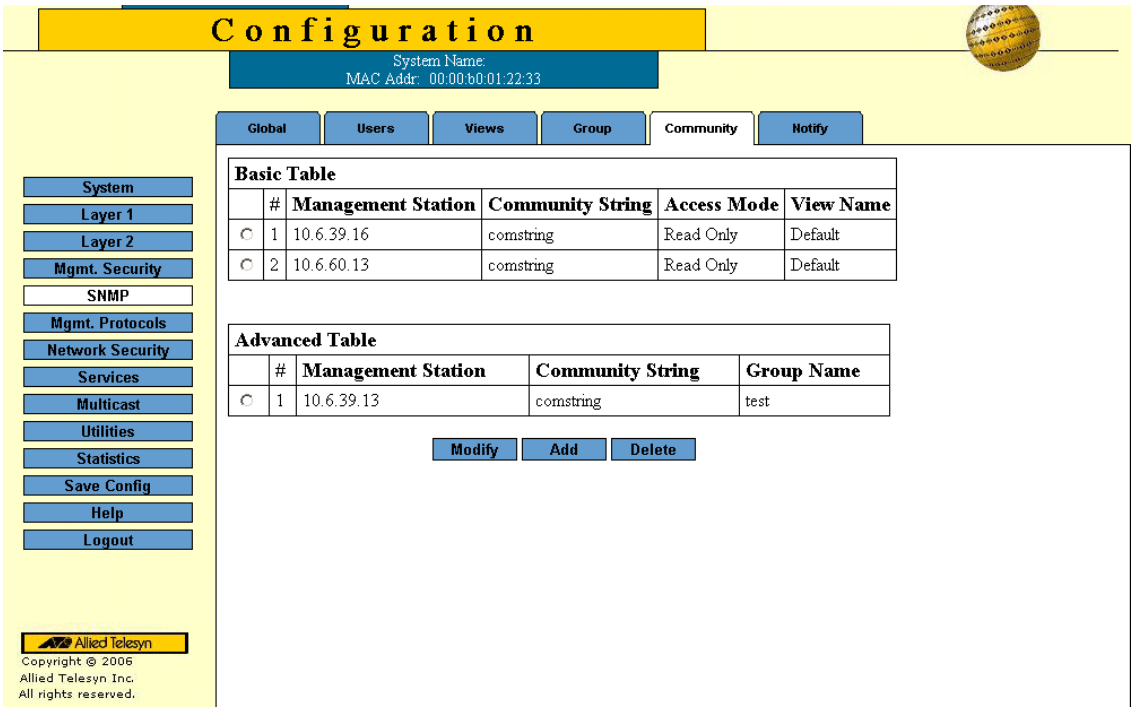
Note

The device switch is delivered with no community strings configured.

To define SNMP communities:

1. Click **SNMP > Community**. The *SNMP Global Page* opens. The *SNMP Community Page* opens:

Figure 70: SNMP Community Page



The *SNMP Community Page* contains the Basic and the Advanced Table:

SNMP Communities Basic Table

The *SNMP Communities Basic Table* contains the following fields:

- **Management Station —** Displays the management station IP address for which the basic SNMP community
- is defined.
- **Community String —** Defines the password used to authenticate the management station to the device.
- **Access Mode —** Defines the access rights of the community. The possible field values are:
  - *Read Only* — Management access is restricted to read-only, and changes cannot be made to the community.

  - *Read Write* — Management access is read-write and changes can be made to the device configuration, but not to the community.
  - *SNMP Admin* — User has access to all device configuration options, as well as permissions to modify the community.

- **View Name** — Contains a list of user-defined SNMP views.

SNMP Communities Advanced Table

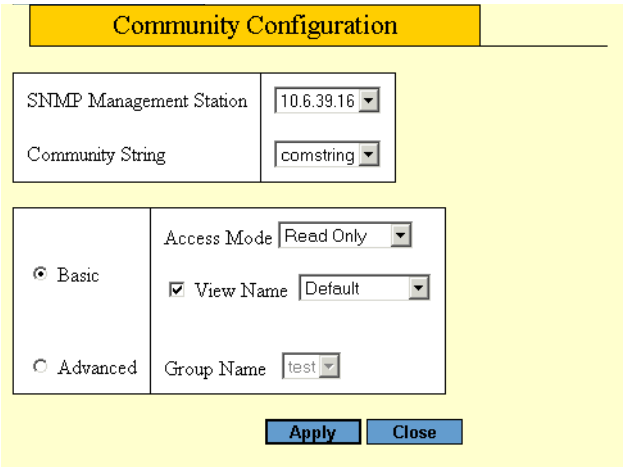
The *SNMP Communities Advanced Table* contains the following fields:

- **Management Station** — Displays the management station IP address for which the advanced SNMP community is defined.
- **Community String** — Defines the password used to authenticate the management station to the device.
- **Group Name** — Defines advanced SNMP community group names.

To modify SNMP community settings:

1. Select an SNMP community entry in the Basic table or in the Advanced Table.
2. Click **Modify**. The *SNMP Community Settings Page* opens:

Figure 71: SNMP Community Settings Page



3. Define the *SNMP Management*, *Community String*, *Access Mode*, *Group Name* and *Basic or Advanced* fields.
4. Click **Apply**. The SNMP community settings are modified, and the device is updated.

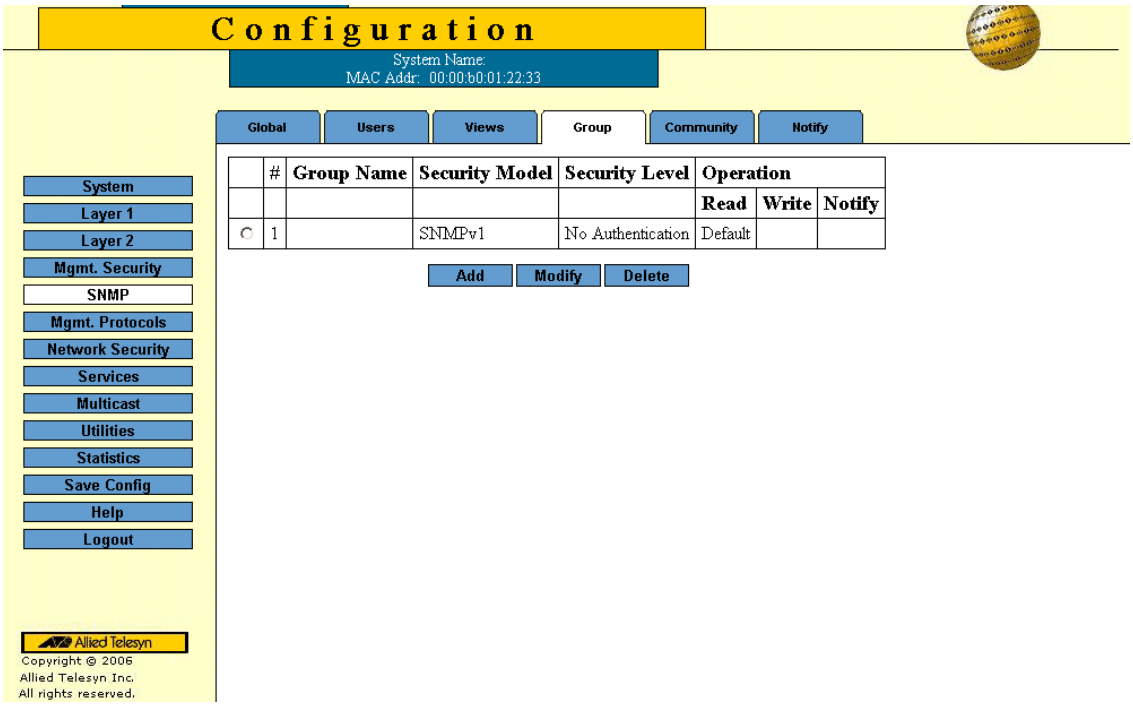
Defining SNMP Groups

The provides information for creating SNMP groups, and assigning SNMP access control privileges to SNMP groups. Groups allow network managers to assign access rights to specific device features, or feature aspects.

To define an SNMP group:

1. Click **SNMP > Groups**. The *SNMP Group Page* opens:

Figure 72: SNMP Group Page



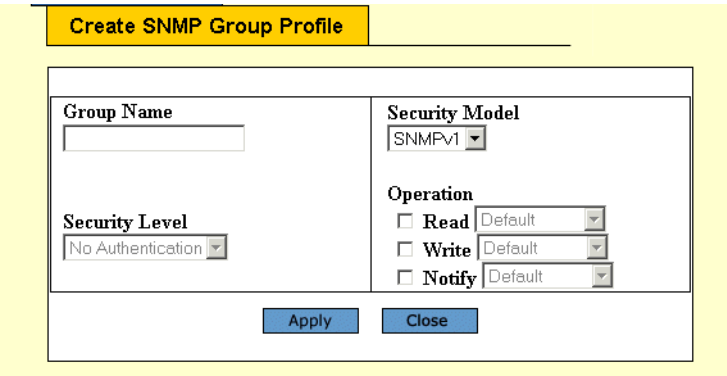
The *SNMP Group Page* contains the following fields:

- **Group Name** — Displays the user-defined group to which access control rules are applied. The field range is up to 30 characters.
- **Security Model** — Defines the SNMP version attached to the group. The possible field values are:
  - *SNMPv1* — SNMPv1 is defined for the group.
  - *SNMPv2c* — SNMPv2c is defined for the group.
  - *SNMPv3* — SNMPv3 is defined for the group.
- **Security Level** — Defines the security level attached to the group. Security levels apply to SNMPv3 only. The possible field values are:
  - *No Authentication* — Indicates that neither the Authentication nor the Privacy security levels are assigned to the group.
  - *Authentication* — Authenticates SNMP messages, and ensures that the SNMP message's origin is authenticated.
  - *Privacy* — Encrypts SNMP messages.
- **Operation** — Defines the group access rights. The possible field values are:

- *Read* — Management access is restricted to read-only, and changes cannot be made to the assigned SNMP view.
- *Write* — Management access is read-write and changes can be made to the assigned SNMP view.
- *Notify* — Sends traps for the assigned SNMP view.

2. Click **Create**. The *Create SNMP Group Profile Page* opens:

Figure 73: Create SNMP Group Profile Page

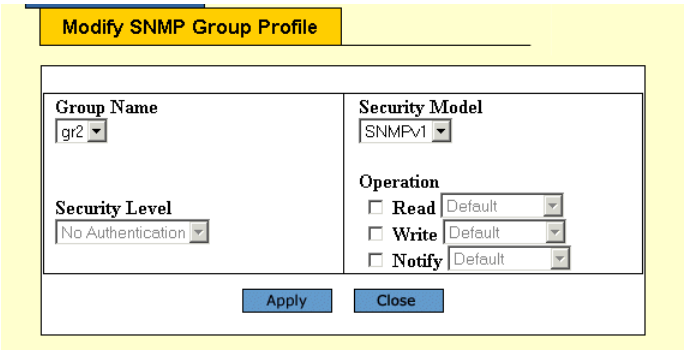


3. Define the *Group Name*, *Security Level*, *Security Model*, and *Operation*.
4. Click **Apply**. The SNMP group profile is saved.

To modify an SNMP group:

1. Click **SNMP > Groups**. The *SNMP Group Page* opens.
2. Click **Modify**. The *Modify SNMP Group Profile Page* opens:

Figure 74: Modify SNMP Group Profile Page



3. Define the *Group Name*, *Security Level*, *Security Model*, and *Operation*.
4. Click **Apply**. The SNMP group profile is saved.

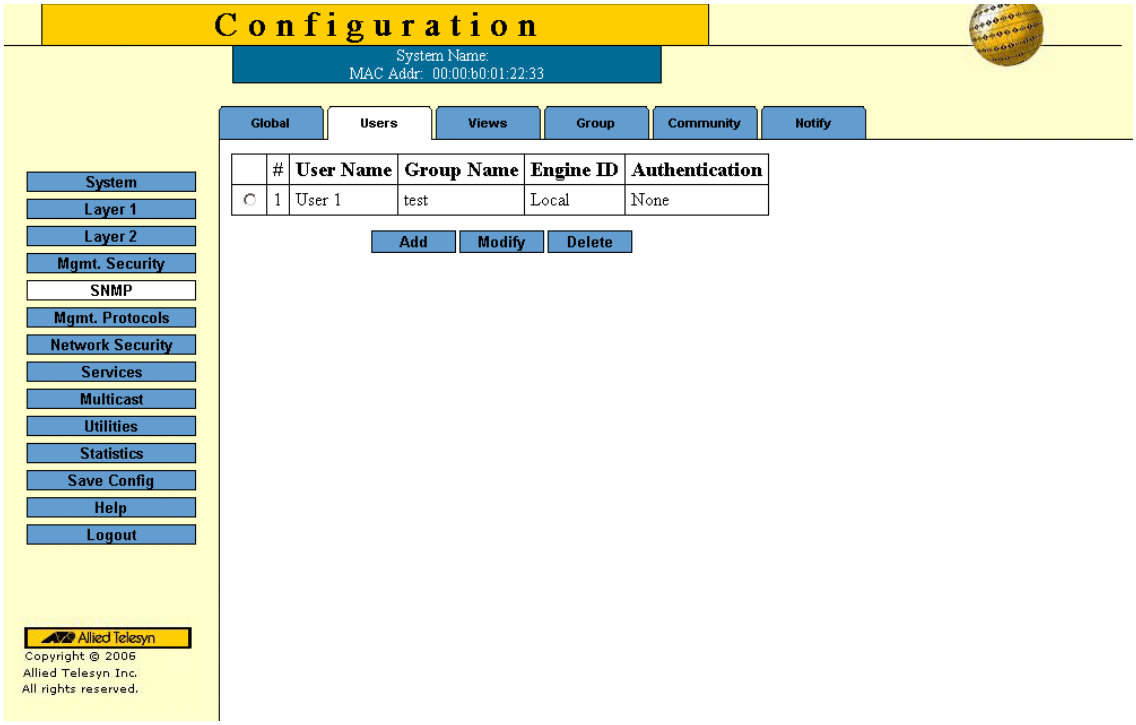
Defining SNMP Users

The *SNMP Users Page* enables assigning system users to SNMP groups, as well as defining the user authentication method.

To define SNMP group membership:

1. Click SNMP > Users. The *SNMP Users Page* opens:

Figure 75: SNMP Users Page



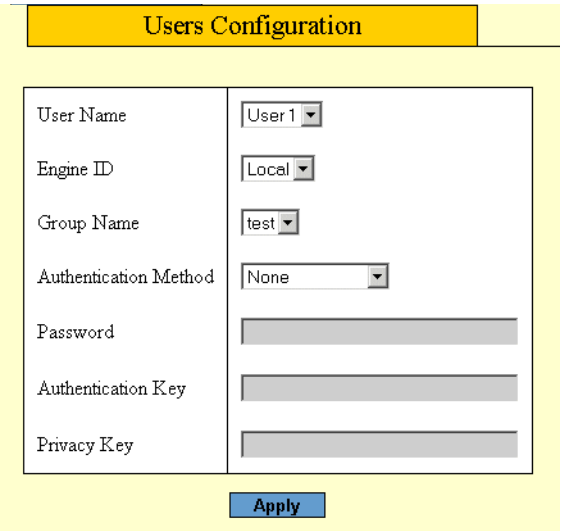
The*SNMP Users Page* contains the following fields:

- **User Name —** Contains a list of user-defined user names. The field range is up to 30 alphanumeric characters.
- **Group Name —** Contains a list of user-defined SNMP groups. SNMP groups are defined in the *SNMP Group Profile Page*.
- **Engine ID —** Displays either the local or remote SNMP entity to which the user is connected. Changing or removing the local SNMP Engine ID deletes the SNMPv3 user database.
  - *Local* — Indicates that the user is connected to a local SNMP entity.
  - *Remote* — Indicates that the user is connected to a remote SNMP entity. If the Engine ID is defined, remote devices receive inform messages.
- **Authentication —** Displays the method used to authenticate users. The possible field values are:
  - *MD5 Key* — Users are authenticated using the HMAC-MD5 algorithm.
  - *SHA Key* — Users are authenticated using the HMAC-SHA-96 authentication level.
  - *MD5 Password* — The HMAC-MD5-96 password is used for authentication. The user should enter a password.

- *SHA Password* — Users are authenticated using the HMAC-SHA-96 authentication level. The user should enter a password.
- *No Authentication* — No user authentication is used.

2. Click **Modify**. The *SNMP User Settings Page* opens:

Figure 76: SNMP User Settings Page



The *SNMP User Settings Page* contains the following additional SNMPv3 fields:

- **Authentication Method** — Defines the SNMP *Authentication* method.
- **Password** — Defines the password for the group member.
- **Authentication Key** — Defines the HMAC-MD5-96 or HMAC-SHA-96 authentication level. The authentication and privacy keys are entered to define the authentication key. If only authentication is required, 16 bytes are defined. If both privacy and authentication are required, 32 bytes are defined. Each byte in hexadecimal character strings is two hexadecimal digits. Each byte can be separated by a period or a colon.
- **Privacy Key** — Defines the privacy key (LSB). If only authentication is required, 20 bytes are defined. If both privacy and authentication are required, 36 bytes are defined. Each byte in hexadecimal character strings is two hexadecimal digits. Each byte can be separated by a period or colon.

3. Define the *User Name*, *Group Name*, *Engine ID*, *Authentication Method*, *Password*, *Authentication Key*, and *Privacy Key* fields.
4. Click **Apply**. The SNMP group membership is modified, and the device is updated.

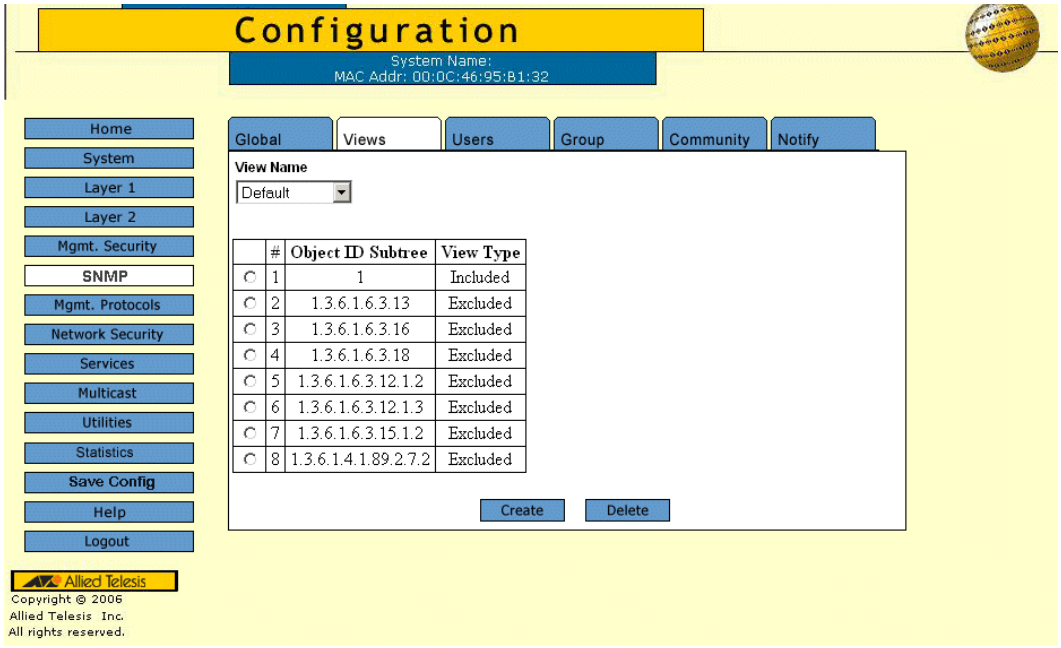
Defining SNMP Views

The SNMP views provide or block access to device features or portions of features. For example, a view can be defined which provides that SNMP group A has Read Only (R/O) access to Multicast groups, while SNMP group B has Read-Write (R/W) access to Multicast groups. Feature access is granted via the MIB name or MIB Object ID.

To define SNMP views:

1. Click **SNMP > Views**. The *SNMP Views Page* opens:

Figure 77: SNMP Views Page

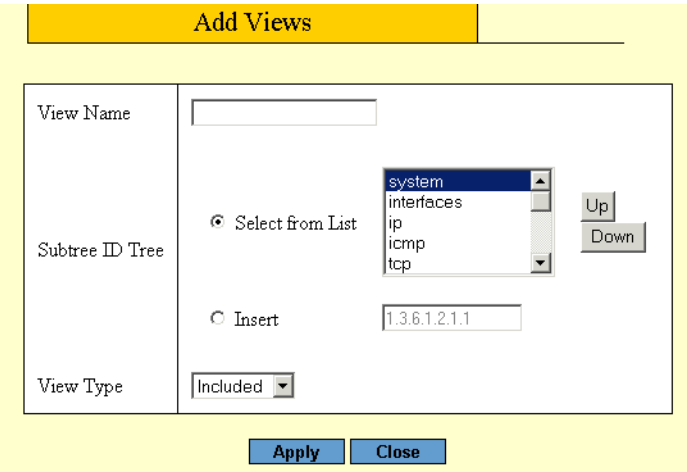


The *SNMP Views Page* contains the following fields:

- **View Name** — Displays the user-defined views. The view name can contain a maximum of 30 alphanumeric characters.
- **Object ID Subtree** — Displays the device feature OID included in or excluded from the selected SNMP view.
- **View Type** — Indicates whether the defined OID branch will be included in or excluded from the selected SNMP view.

2. Click **Create**. The *Add SNMP VIew Page* opens:

Figure 78: Add SNMP VIew Page



3. Define the *View Name* field.
4. Select the *Subtree ID Tree* using the Up/down buttons and define the *Insert* field.
5. Click **Apply**. The view is defined, and the device is updated.

Configuring SNMP Notifications

The SMNMP *SNMP Notify Page* enables the configuration of notification recipients. the page contains information for defining filters that determine whether traps are sent to specific users, and the trap type sent. SNMP notification filters provide the following services:

- Identifying Management Trap Targets
- Trap Filtering
- Selecting Trap Generation Parameters
- Providing Access Control Checks

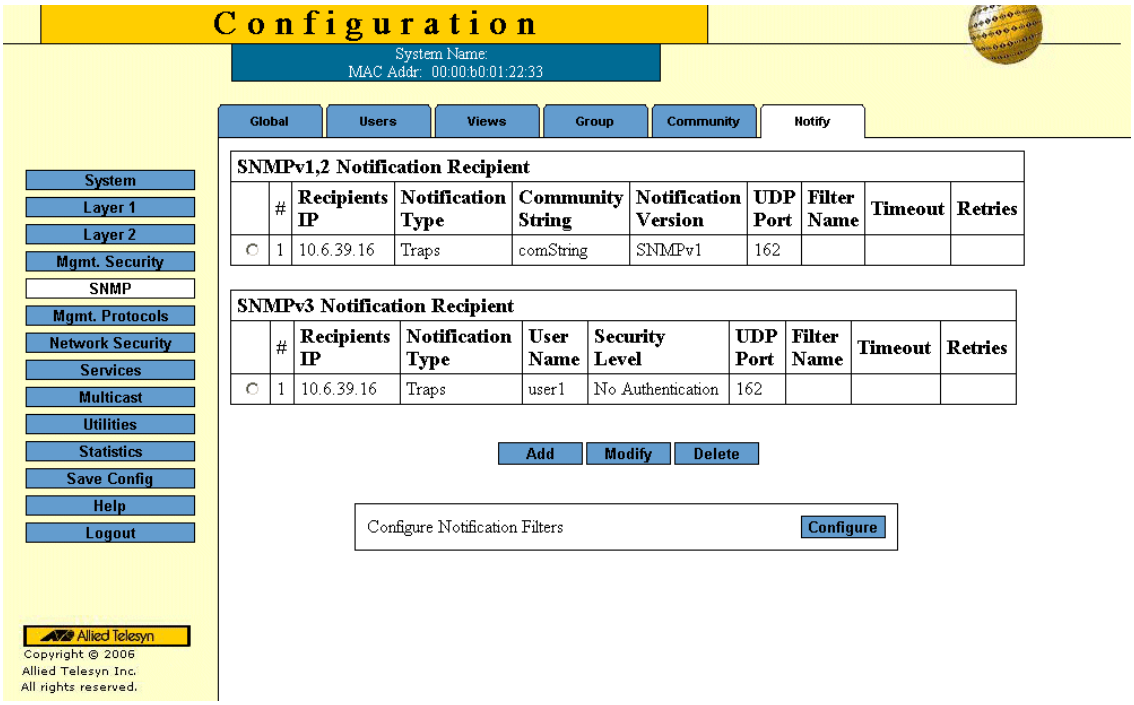
Defining Notification Recipients

To define SNMP notification receivers:

To configure SNMP notification recipients:

1. Click **SNMP > Notify**. The *SNMP Notify Page* opens:

Figure 79: SNMP Notify Page



The *SNMP Notify Page* contains tables for SNMPv2 and SNMP v3 notification recipients and lists the following parameters:

SNMPv1,2c Notification Recipient

The *SNMP v1, v2c Recipient* table contains the following fields:

- **Recipients IP —** Displays the IP address to which the traps are sent.
- **Notification Type** — Displays the type of notification sent. The possible field values are:
  - *Trap* — Indicates that traps are sent.
  - *Inform* — Indicates that informs are sent.
- **Community String** — Displays the community string of the trap manager.
- **Notification Version** — Displays the trap type. The possible field values are:
  - *SNMP V1* — Indicates that SNMP Version 1 traps are sent.
  - *SNMP V2c* — Indicates that SNMP Version 2 traps are sent.
- **UDP Port** — Displays the UDP port used to send notifications. The field range is 1-65535. The default is 162.
- **Filter Name** — Indicates if the SNMP filter for which the SNMP Notification filter is defined.
- **Timeout** — Indicates the amount of time (in seconds) the device waits before resending informs. The field range is 1-300. The default is 15 seconds.
- **Retries** — Indicates the number of times the device resends an inform request. The field range is 1-255. The default is 3.

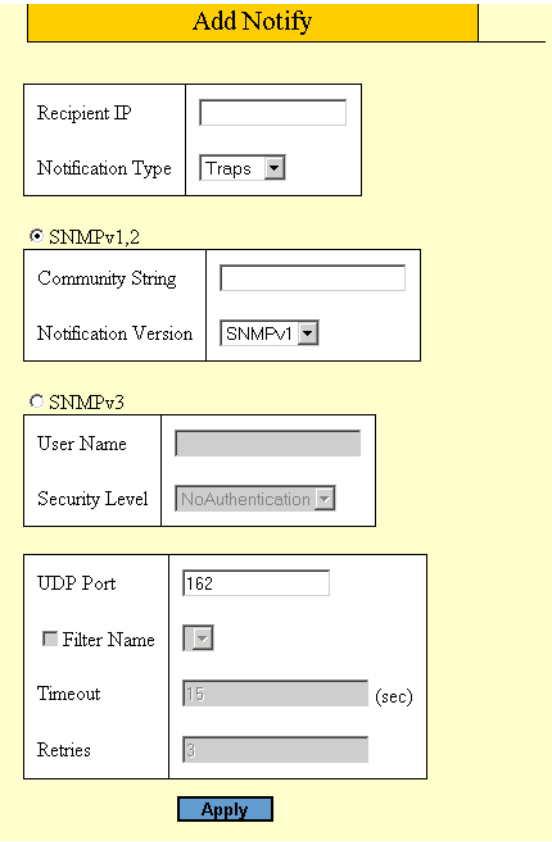
SNMPv3 Notification Recipient

The *SNMPv3 Notification Recipient* table contains the following fields:

- **Recipients IP** — Displays the IP address to which the traps are sent.
- **Notification Type** — Displays the type of notification sent. The possible field values are:
  - *Trap* — Indicates that traps are sent.
  - *Inform* — Indicates that informs are sent.
- **User Name** — Displays the user to which SNMP notifications are sent.
- **Security Level** — Displays the means by which the packet is authenticated. The possible field values are:
  - *No Authentication* — Indicates that the packet is neither authenticated nor encrypted.
  - *Authentication* — Indicates that the packet is authenticated.
- **UDP Port** — Displays the UDP port used to send notifications. The field range is 1-65535. The default is 162.
- **Filter Name** — Includes or excludes SNMP filters.
- **Timeout** — Indicates the amount of time (in seconds) the device waits before resending informs. The field range is 1-300. The default is 15 seconds.
- **Retries** — Indicates the number of times the device resends an inform request. The field range is 1-255.The default is 3.
- **Remove** — Deletes the currently selected recipient. The possible field values are:
  - *Checked* — Removes the selected recipient from the list of recipients.
  - *Unchecked* — Maintains the list of recipients.

2. Click **Create**. The *Create SNMP Notification Recipient Page* opens:

Figure 80: Create SNMP Notification Recipient Page



3. Define the *Recipient IP*, *Notification Type*, *SNMPv1,2 Community String*, *Notification Version*, *SNMPv3 User Name* and *Security Level* fields.
4. Click **Apply**. The notification recipient settings are saved and the device is updated.

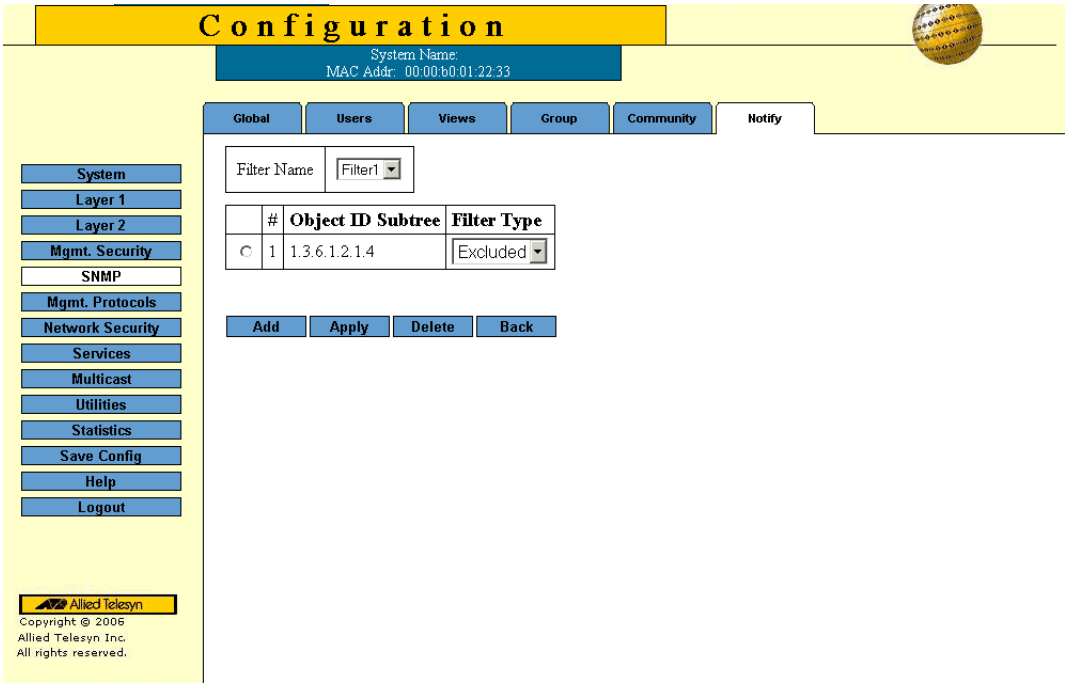
Defining Notification Filters

The *SNMP Notification Filter Page* permits filtering traps based on OIDs. Each OID is linked to a device feature or a portion of a feature. The *SNMP Notification Filter Page* also allows network managers to filter notifications.

To configure SNMP notification filters:

1. Click **SNMP > Notify**. The *SNMP Notify Page* opens.
2. Click **Configure** next to *Configure Notification Filters*. The opens:

Figure 81: SNMP Notification Filter Settings Page



3. Define the *Filter Name*, *New Object Identifier Tree*, and *Filter Type* fields.
4. Click **Apply**. The SNMP notification filter is defined, and the device is updated.

Section 11. Configuring Power Over Ethernet

This section describes configuring Power over Ethernet (PoE) for an AT-8000S device. PoE only applies to the AT-8000S/24POE and AT-8000S/48POE device.

Power-over-Ethernet (PoE) provides power to devices over existing LAN cabling, without updating or modifying the network infrastructure. Power-over-Ethernet removes the necessity of placing network devices next to power sources. Power-over-Ethernet can be used in the following applications:

- IP phones
- Wireless Access Points
- IP gateways
- PDAs
- Audio and video remote monitoring

Powered Devices are devices which receive power from the device power supplies, for example IP phones. Powered Devices are connected to the device via Ethernet ports.

This section includes the following topics:

- Enabling PoE and Setting the Power Threshold
- Defining PoE Settings

Enabling PoE and Setting the Power Threshold

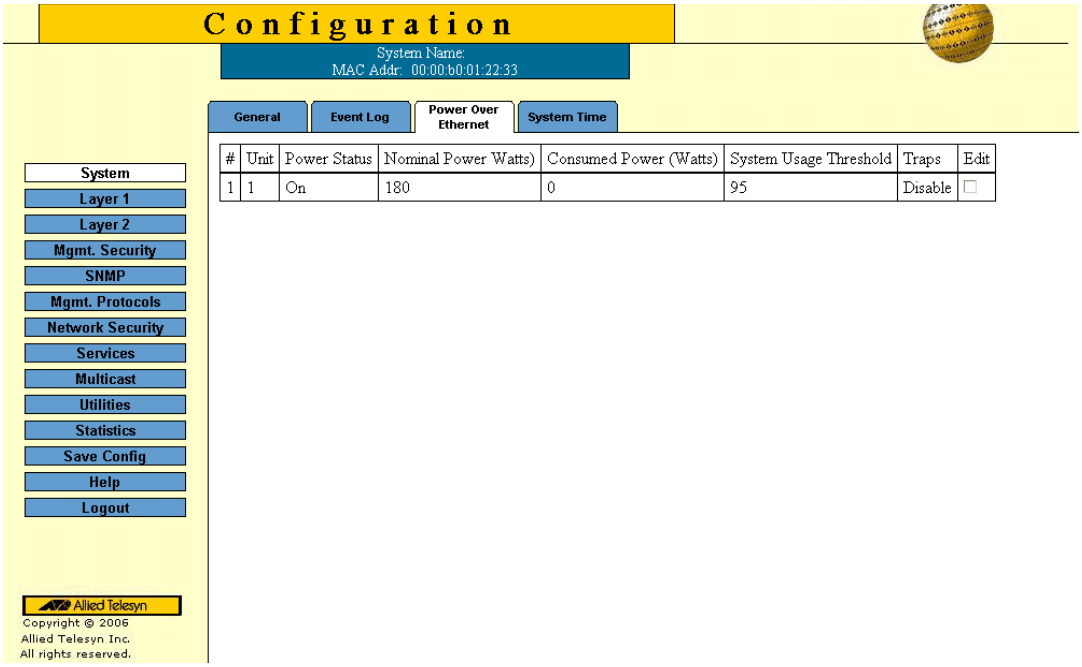
The PoE threshold is a percentage of the total maximum PoE power on the device (400 W). If the total power requirements of the powered devices exceed this threshold, the device sends an SNMP trap to the management workstation and enters an event in the event log. The threshold is adjustable. For management workstations to receive traps from the device, configure SNMP on the device by specifying the IP addresses of the workstations.

The *Power Over Ethernet Page* contains system PoE information for enabling PoE on the device, monitoring the current power usage, and enabling PoE traps.

To enable PoE for the device:

1. Click **System > Power Over Ethernet**. The *Power Over Ethernet Page* opens:

Figure 82: Power Over Ethernet Page



The *Power Over Ethernet Page* contains the following fields:

- **Unit Number** — Indicates the stacking member for which the PoE information is displayed.
- **Power Status**— Indicates if the port is enabled to work on PoE. The possible field values are:
  - *On* — Indicates the device is delivering power to the interface.
  - *Off* — Indicates the device is not delivering power to the interface.
  - *Test Fail* —Indicates the powered device test has failed. For example, a port could not be enabled and cannot be used to deliver power to the powered device.
  - *Testing* — Indicates the powered device is being tested. For example, a powered device is tested to confirm it is receiving power from the power supply.
  - *Searching* — Indicates that the device is currently searching for a powered device. Searching is the default PoE operational status.

  - *Fault* — Indicates that the device has detected a fault on the powered device. For example, the powered device memory could not be read.
- **Nominal Power** — Indicates the actual amount of power the device can supply. The field value is displayed in Watts.
- **Consumed Power** — Indicates the amount of the power used by the device. The field value is displayed in Watts.
- **System Usage Threshold** — Indicates the percentage of power consumed before an alarm is generated. The value range is 1-100 percent; the default value is 95 percent. At the default setting of 95%, the threshold is exceeded when the PoE devices require more than 380 W, which is 95% of 400 W.
- **Traps** — Indicate if PoE device traps are enabled.

The Zoom View shows device ports and indicators of current PoE port status. The possible port settings are:

 *Port is active* — Indicates the port is linked.

 *Port is inactive* — Indicates the port is not linked.

 *Port is disabled* — Indicates the port is disabled.

 *Port is selected* — Indicates the port is selected.

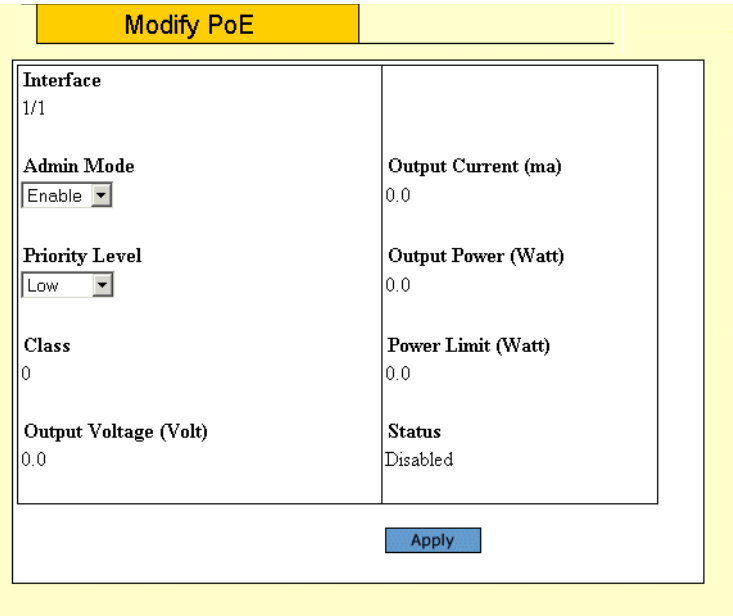
2. Click the ports to enable. Clicking a port toggles it through the possible settings.
3. Define the fields.
4. Click **Apply**. PoE is enabled on the device and global settings are saved. The new threshold is immediately activated on the device.
5. Click **Save Config** on the menu to permanently save the change.

Defining PoE Settings

To modify PoE port settings:

1. In the *Power Over Ethernet Page* Zoom View, click the port(s) to modify. The port indication changes to *Port is selected*.
2. Click **Modify**. The *Modify PoE Page* opens:

Figure 83: Modify PoE Page



The *Modify PoE Page* displays the currently configured PoE ports and contains the following information:

- **Interface** — Displays the selected port's number.
- **Admin Mode** — Indicates whether PoE is enabled or disabled on the port. The possible values are:
  - *Enable* — Enables PoE on the port. This is the default setting.
  - *Disable* — Disables PoE on the port.
- **Priority Level** — Indicates the PoE ports' priority. The possible values are: *High*, *Medium* and *Low*. The default is *Low*.
- **Class** — Indicates the power class, the IEEE 802.3af class of the device.
- **Output Voltage** — The voltage delivered to the powered device.
- **Output Current** — The current drawn by the powered device.
- **Output Power** — Indicates the power being supplied to the device, in Watts.
- **Power Limit** — Indicates the maximum amount of power allowed by the port for the device. The default is 15400 milliwatts (15.4 W), and the range is 3000.-15400 milliwatts.
- **Status**— Indicates if the port is enabled to work on PoE. The possible field values are:
  - *On* — Indicates the device is delivering power to the interface.
  - *Off* — Indicates the device is not delivering power to the interface.
  - *Test Fail* —Indicates the powered device test has failed. For example, a port could not be enabled and cannot be used to deliver power to the powered device.
  - *Testing* — Indicates the powered device is being tested. For example, a powered device is tested to confirm it is receiving power from the power supply.
  - *Searching* — Indicates that the device is currently searching for a powered device. Searching is the default PoE operational status.
  - *Fault* — Indicates that the device has detected a fault on the powered device. For example, the powered device memory could not be read.

3. Modify the *Admin Mode* and *Priority Level* fields.
4. Click **Apply**. The PoE settings are saved and the device is updated.
5. Click **Save Config** on the menu, to save the settings permanently.

Section 12. Configuring Services

This section describes Quality of Service related configurations.

After packets are assigned to a specific egress queue, Class of Service (CoS) services can be assigned to the queue. Egress queues are configured with a scheduling scheme by one of the following methods:

- **Strict Priority** — Ensures that time-sensitive applications are always forwarded. Strict Priority (SP) allows the prioritization of mission-critical, time-sensitive traffic over less time-sensitive applications.For example, under SP, voice over IP (VoIP) traffic can be prioritized so that it is forwarded before FTP or e-mail (SMTP) traffic.
- **Weighted Round Robin** — Ensures that a single application does not dominate the device forwarding capacity. Weighted Round Robin (WRR) forwards entire queues in a round robin order. All queues can participate in WRR, except SP queues. SP queues are serviced before WRR queues. If the traffic flow is minimal, and SP queues do not occupy the whole bandwidth allocated to a port, the WRR queues can share the bandwidth with the SP queues. This ensures that the remaining bandwidth is distributed according to the weight ratio. If WRR is selected, the following weights are assigned to the queues: 1, 2, 4, 8.

This section contains the following topics:

- Enabling Class of Service (CoS)
- Configuring CoS Priorities
- Mapping CoS to Queue
- Mapping DSCP to Queue
- Configuring Bandwidth QoS

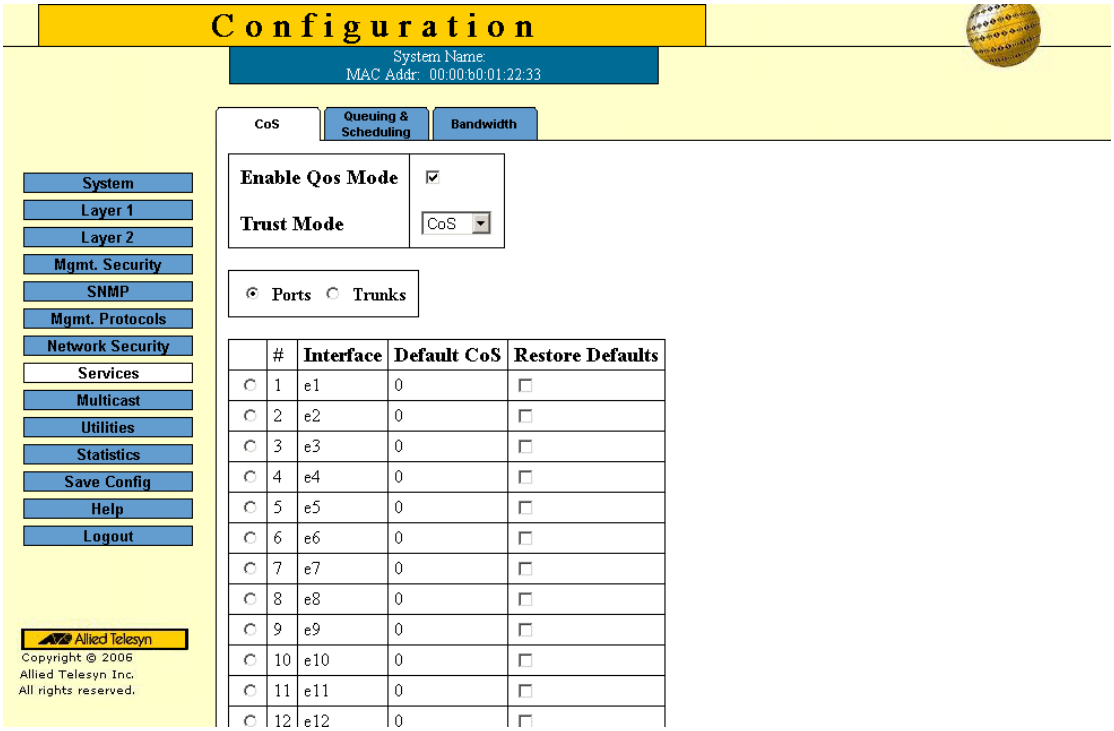
Enabling Class of Service (CoS)

The *CoS Page* enables configuring the CoS ports or trunks on the device.

To configure CoS ports or trunks on the device:

1. Click **Services > CoS**. The *CoS Page* opens:

Figure 84: CoS Page



As a default the *CoS Page* opens displaying the port options. The fields are identical when displaying the trunk CoS. The *CoS Page* contains the following fields:

- **QoS Mode** — Indicates if QoS is enabled on the interface. The possible values are:
  - *Basic* — Enables QoS on the interface.
  - *Disable* — Disables QoS on the interface.
- **Ports** — Displays the Ports CoS table.
- **Of Unit** — Defines the unit number.
- **Trunks** — Displays the Trunks CoS table.

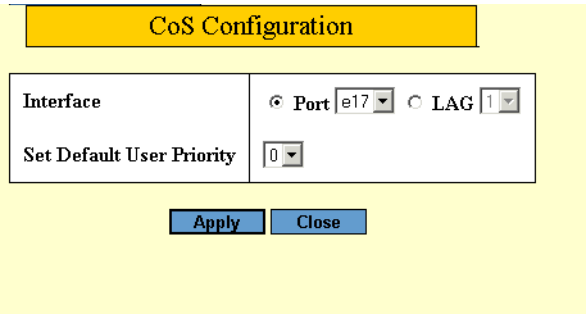
The Cos Ports table displays the following information:

- **Number** — Displays the interface number.
- **Interface** — Lists the interfaces available for CoS configuration.
- **CoS Configuration** — Lists the current configuration.
- **Restore Defaults** — Allows restoring default CoS values.

2. Select the interfaces.
3. Check the **Restore Defaults** option, where needed.

4. Click **Modify**. The *CoS Configuration Page* opens:

Figure 85: CoS Configuration Page



The *CoS Configuration Page* contains the following fields:

- **Interface** — Defines the interface for the CoS being set. The possible field values are:
  - *Port* — Defines CoS for port.
  - *Trunk* — Defines CoS for trunk.
- **Set Default User Priority** — Indicates the priority level for CoS on the selected port/trunk. Default Priority determines the default CoS value for incoming packets. The value range is 0-7 and the default is 0.

5. Select the *Interface* and the *Priority* level.
6. Click **Apply**. The CoS settings for the selected port/trunk are updated.

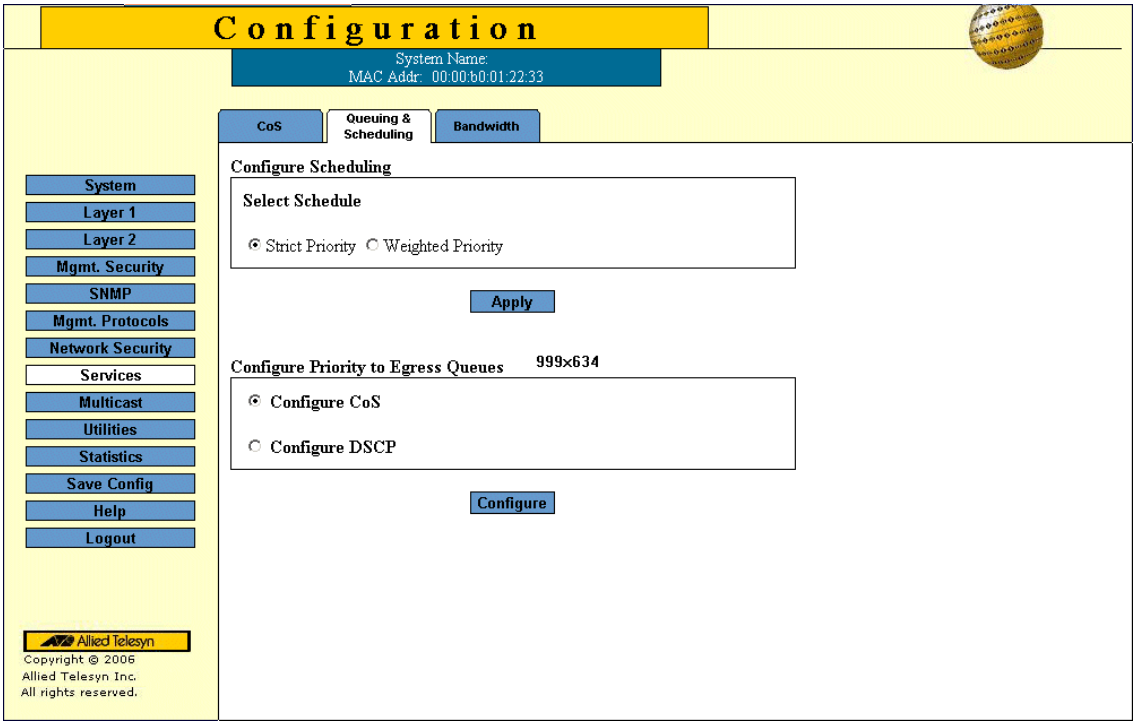
Configuring CoS Priorities

The *CoS Queuing & Scheduling Page* provides fields for configuring CoS Priority to Egress Queues and for defining Egress Weights. The queue settings are set system-wide.

To define schedule and queue settings for Quality of Service:

1. Click **Services > Queuing & Scheduling**. The *CoS Queuing & Scheduling Page* opens:

Figure 86: CoS Queuing & Scheduling Page



The *CoS Queuing & Scheduling Page* contains scheduling and Priority Queue settings for the defined CoS and DSCP and contains the following fields:

- **Select Schedule** — Defines the priority method in queuing.
  - *Strict Priority* — Indicates that traffic scheduling for the selected queue is based strictly on the queue priority.
  - *Weighted Priority* — Indicates that traffic scheduling for the selected queue is based strictly on the Weighted Priority.
- **Configure CoS Priority to Egress Queues** — Maps CoS (VPT tag) to a queue (0-3).
  - *Configure CoS* — Maps CoS priority to a queue.
  - *Configure DSCP Priority* — Maps DSCP priority to a queue (0-3).

2. Select a schedule type.
3. Click **Apply**. The configuration is saved and the device is updated.

Mapping Queues

This section contains the following topics:

- Mapping CoS Values to Queues
- Mapping DSCP Values to Queues

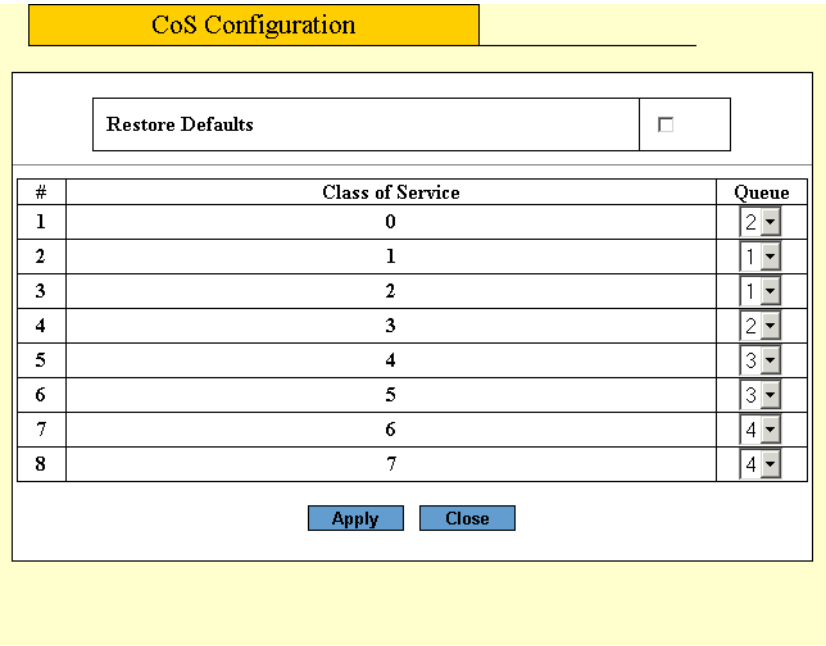
Mapping CoS Values to Queues

The *Configure CoS Page* contains fields for classifying CoS settings to traffic queues.

To set CoS to queue:

1. Click **Services > Queuing & Scheduling**. The *CoS Queuing & Scheduling Page* opens:
2. Select the *Configure CoS Priority to Egress Queues* values.
3. Click **Configure CoS**.
4. Click **Configure**. The *Configure CoS Page* opens:

Figure 87: Configure CoS Page



The *Configure CoS Page* contains the following fields:

- **Restore Defaults —** Allows you to restore default settings.
- **Class of Service —** Specifies the CoS priority tag values, where zero is the lowest and 3 is the highest.
- **Queue —** Defines the traffic forwarding queue to which the CoS priority is mapped. Four traffic priority queues are supported, where zero is the lowest and 3 is the highest.

5. Modify the *Queue* values or select *Restore Defaults*.
6. Click **Apply**. The *CoS to Queue* mapping settings are saved and the device is updated.

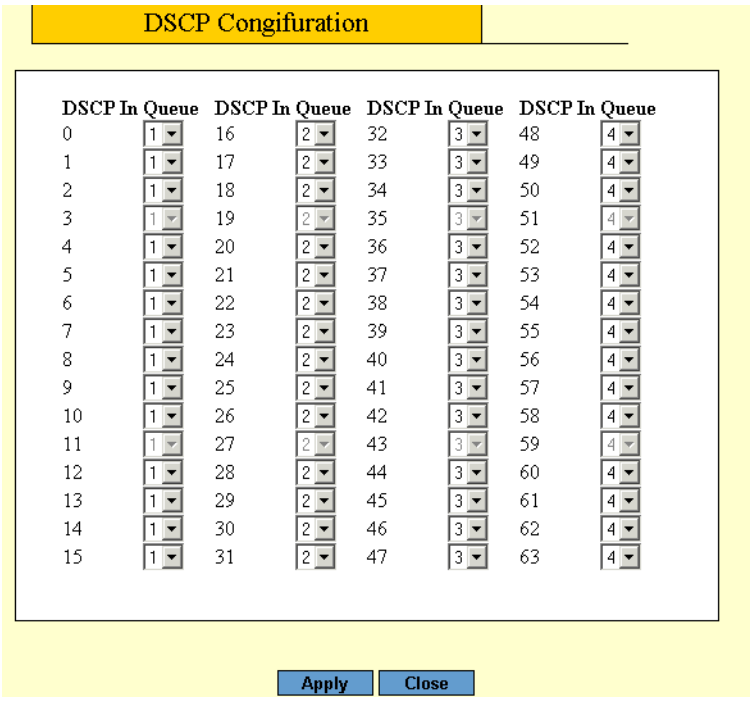
Mapping DSCP Values to Queues

The *Configure DSCP Page* contains fields for classifying DSCP settings to traffic queues. For example, a packet with a DSCP tag value of 3 can be assigned to queue 2.

To set DSCP to queues:

1. Click **Services > Queuing & Scheduling**. The *CoS Queuing & Scheduling Page* opens:
2. Select the *Configure DSCP Priority* values.
3. Click **Configure DSCP**.
4. Click **Configure**. The *Configure DSCP Page* opens:

Figure 88: Configure DSCP Page



The *Configure DSCP Page* contains the following fields:

- **DSCP In** — Displays the incoming packet's DSCP value.
- **Queue** — Defines the traffic forwarding queue to which the DSCP priority is mapped. Four traffic priority queues are supported.

2. Modify the *Queue* values.
3. Click **Apply**. The *DSCP to Queue* mapping is updated.

Configuring Bandwidth QoS

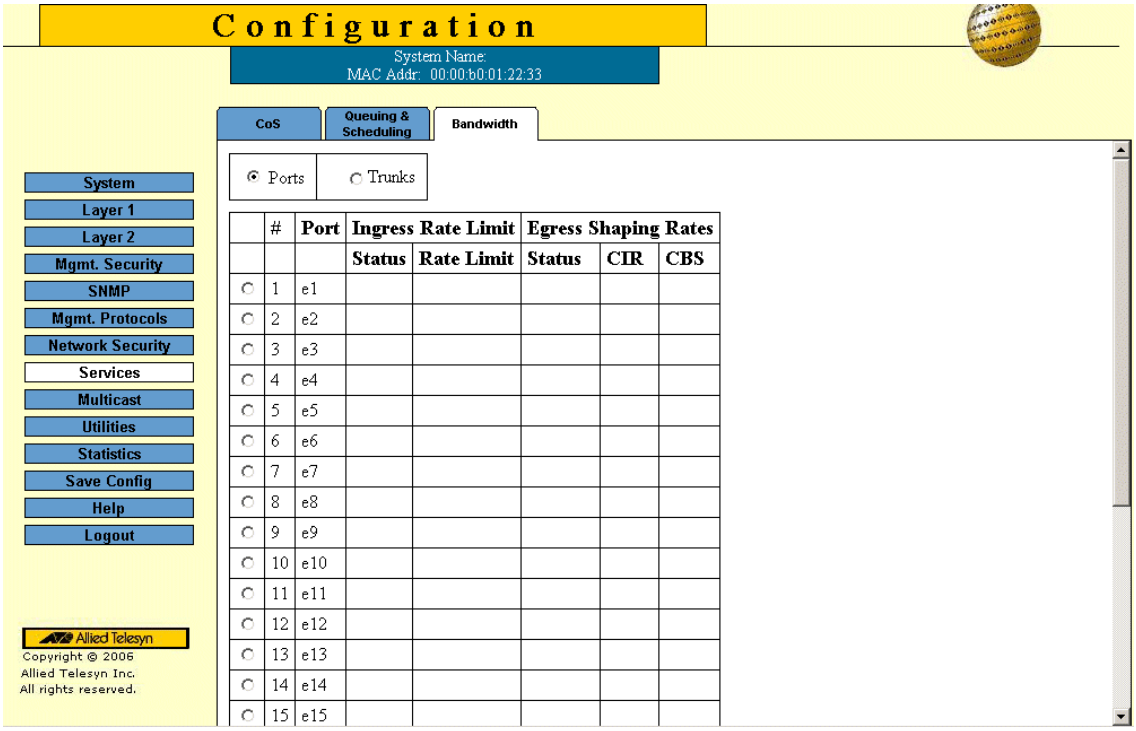
The*Bandwidth Page* allows network managers to define the bandwidth settings for a specified egress interface. Modifying queue scheduling affects the queue settings globally. The *Bandwidth Page* is not used with the Service mode, as bandwidth settings are based on services.

Queue shaping can be based per queue and/or per interface. Shaping is determined by the lower specified value. The queue shaping type is selected in the *Bandwidth Page.*

To configure bandwidth:

1. Click **Services > Bandwidth**. The *Bandwidth Page* opens:

Figure 89: Bandwidth Page



As a default the *Bandwidth Page* opens displaying the port options. The fields are identical when displaying the trunk CoS. The *Bandwidth Page* contains the following fields:

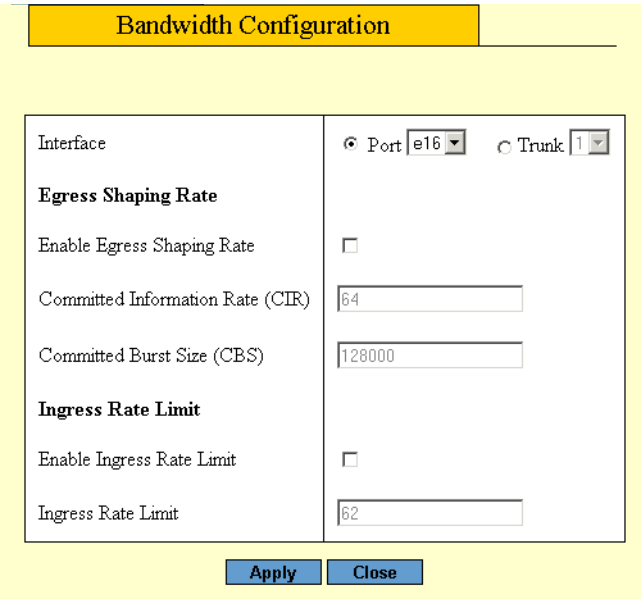
- **Port** — Indicates the interface for which the queue shaping information is displayed. The field values are:
- **Of Unit** — Indicates the stacking members for which the bandwidth settings are displayed.
  - *Port* — Indicates the port for which the bandwidth settings are displayed.
  - *LAG* — Indicates the LAG for which the bandwidth settings are displayed.
- **Ingress Rate Limit Status** — Indicates the traffic limit for the port. The possible field values are:
  - *Enable* — Rate Limit is enabled.

  - *Disable* — Rate Limit is disabled.

- **Ingress Rate Limit** — Indicates the traffic limit for the port.
- **Egress Shaping Rates** — Configure the traffic shaping type. The possible field values are:
  - *Committed Information Rate (CIR)* — Defines CIR as the queue shaping type. The possible value range is 4096 *-1,000,000,000 bits per second.*
  - *Committed Burst Size (CBS)* — Defines CBS as the queue shaping type. The possible value range is *4096-16,000,000 bytes.*
  - *None* — Indicates that a queue shaping type is not defined. This is default value.

2. Select the port/unit or trunk.
3. Select the interfaces to configure.
4. Click **Modify**. The *Bandwidth Configuration Page* opens:

Figure 90: Bandwidth Configuration Page



5. Define the *Interface*, *Committed Information Rate*, *Egress Shaping Rate on Selected Port*, *Committed Burst Size*, *Ingress Rate Limit Status*, and *Ingress Rate Limit* fields.
6. Click **Apply**. The bandwidth information is saved and the device is updated.

Section 13. Managing System Files

The configuration file structure involves the following configuration files:

- **Startup Configuration File** — Contains the commands required to reconfigure the device to the same settings as when the device is powered down or rebooted. The Startup file is created by copying the configuration commands from the Running Configuration file or the Backup Configuration file.
- **Running Configuration File** — Contains all configuration file commands, as well as all commands entered during the current session. After the device is powered down or rebooted, all commands stored in the Running Configuration file are lost. During the startup process, all commands in the Startup file are copied to the Running Configuration File and applied to the device. During the session, all new commands entered are added to the commands existing in the Running Configuration file. Commands are not overwritten. To update the Startup file, before powering down the device, the Running Configuration file must be copied to the Startup Configuration file. The next time the device is restarted, the commands are copied back into the Running Configuration file from the Startup Configuration file.
- Backup Configuration Files — Contains a backup copy of the device configuration. Up to five backup configuration files can be saved on the device, with user configured names. These files are generated when the user copies the Running Configuration file or the Startup Configuration file to a user-named file. The contents of the backup configuration files can be copied to either the Running Configuration or the Startup Configuration files.
- **Image Files** — Software upgrades are used when a new version file is downloaded. The file is checked for the right format, and that it is complete. After a successful download, the new version is marked, and is used after the device is reset.

There are two types of files, firmware files and configuration files. The firmware files manage the device, while the configuration files configure the device for transmissions. Configuration files can be uploaded and downloaded to the device.

System files are uploaded or downloaded using the *Trivial File Transfer Protocol* (TFTP). TFTP utilizes the *User Data Protocol* (UDP) without security features.

Note

Only one type of download or upload can be performed at any one time. During upload or download, no user configuration can be performed.

File maintenance includes configuration file management and device access. This section describes the following topics:

- Restoring the Default Configuration
- Defining TFTP File Uploads and Downloads

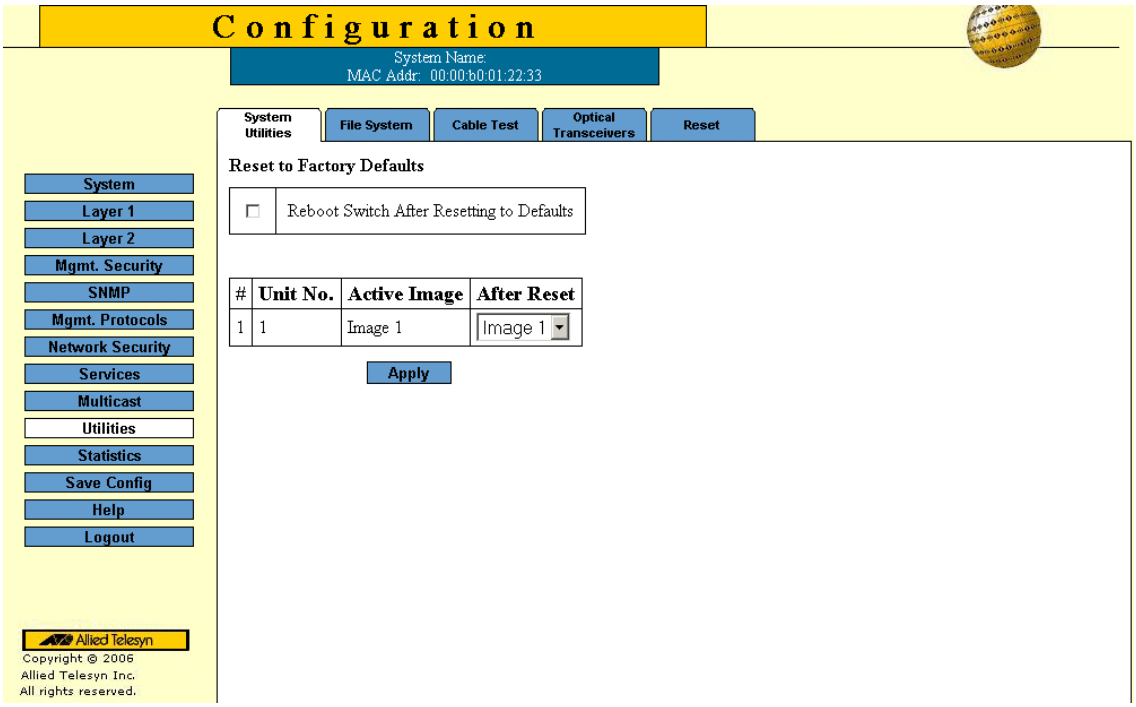
Restoring the Default Configuration

The *Reset to Factory Defaults* function restores the Configuration file to factory defaults after the device is reset. When this option is not selected, the device maintains the current Configuration file.

To restore the default system configuration:

1. Click **Utilities > System Utilities**. The *System Utilities Page* opens:

Figure 91: System Utilities Page



The *System Utilities Page* contains the following fields:

- **Reboot Switch After Resetting to Defaults** — Performs reboot after the reset.
- **Unit No.** — Indicates the unit number.
- **Active Image** — indicates the current image file.
- **After Reset** — Defines which image file will be used after reset.
- **Apply** — Resets the device.

To reset the configuration file to defaults without rebooting the device:

- Click **Apply** in the *Reset to Factory Defaults* section.

To reset the configuration file to defaults with reboot:

1. Check the **Reboot Switch After Resetting to Defaults** option.
2. Select the **After Reset** image file.
3. Click **Apply**. The factory defaults are restored, and the device is updated. The device reboots.

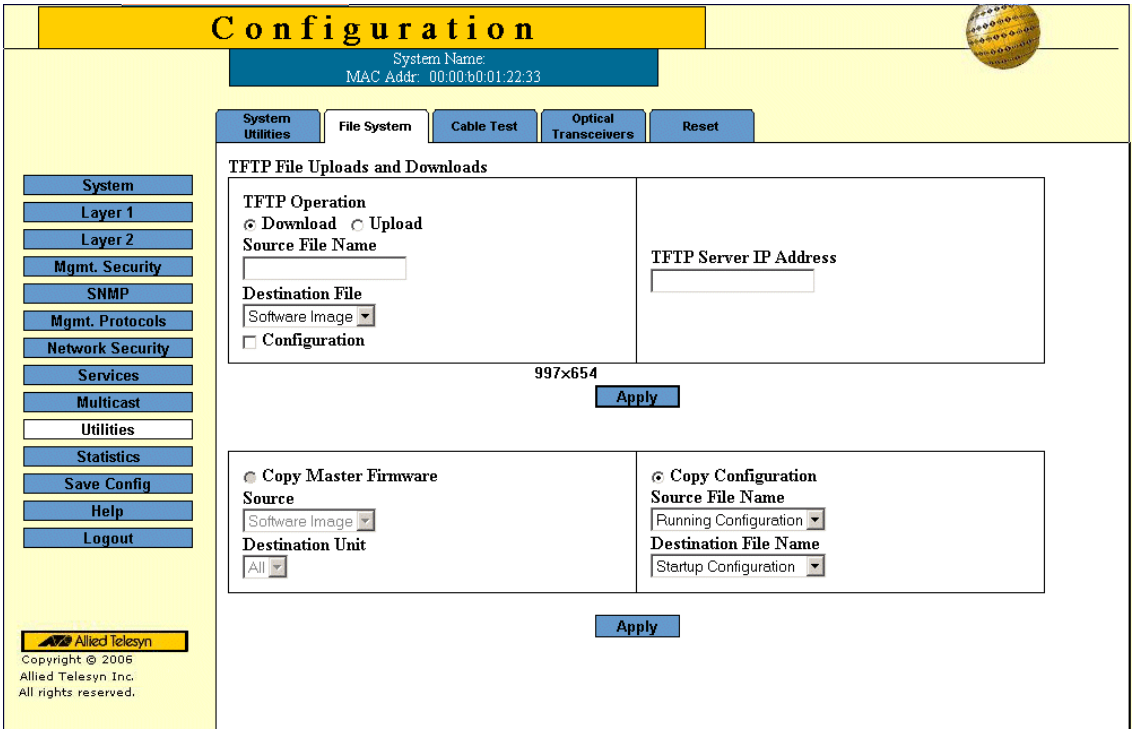
Defining TFTP File Uploads and Downloads

The *File System Page* contains parameters for system uploads and downloads and for copying firmware and configuration files.

To define file upload and download settings:

1. Click **Utilities > File System** The *File System Page* opens:

Figure 92: File System Page



The *TFTP File Uploads and Downloads* section of the *File System Page* contains the following fields:

- **TFTP Server IP Address** — Specifies the TFTP Server IP Address from which files are downloaded.
- **TFTP Operation** — Defines the type of TFTP operation. The possible values are:
  - *Download* — Downloads the file.
  - *Upload* — Uploads the file.
- **TFTP Remote Filename** — Indicates the name of the destination file.
- **TFTP Local Filename** — Indicates the name of the file on the TFTP server.
- **TFTP Boot Type** — Defines the type of boot operation. The possible values are:
  - *Image* — Boots the Image file.
  - *Config (set default & reboot)* — Copies the configuration file on the TFTP server.

– *Boot* — Downloads or uploads the Boot file.

Note

The configuration file is copied only to the Master Unit, since this unit controls the entire stack. The configuration file is automatically synchronized with the configuration file on the Backup Unit, so that in the event of failure of the Master Unit, the Backup Unit takes over immediately with the same configuration information.

To download or upload *TFTP File*s:

1. Select the *TFTP Operation* type: upload or download
1. Define the fields.
2. Select the *Boot Type*.
3. Click **Apply**.

The *Firmware Copy* section of the *File System Page* contains the following fields:

- **Copy Master Firmware** —Copies the Firmware from the the Stacking Master.
- **Source** — Specifies the file to be copied.
  - *Software Image* — Downloads the Image file.
  - *Boot Code* — Downloads the Boot file.
- **Destination Unit** — Downloads firmware to the designated unit. The values are:
  - *Unit* — Copies the Firmware to a specific stacking member. The possible field values are stacking members 3-6, and backup.
  - *All* — Copies the Firmware to all stacking member.

To copy firmware:

1. Click **Copy Master Firmware**. The copy firmware parameters are activated.
2. Select the *Source* and the *Destination Unit*.
3. Click **Apply**.

The *Configuration Copy* section of the *File System Page* contains the following fields:

- **Copy Configuration**— Allows the copy configuration operation.
- **Source File Name** — Specifies the configuration files to be copied.
  - *Running Configuration* — Copies the Running Configuration file.
  - *Startup Configuration* — Copies the Startup Configuration file, and overwrites the old Startup Configuration file.
  - *Backup Configuration* — Copies the Backup Configuration file.
- **Destination File Name** — Specifies the destination file to which the configuration file is copied. The possible field values are:
  - *Running Configuration* — Downloads commands into the Running Configuration file.
  - *Startup Configuration* — Downloads the Startup Configuration file, and overwrites it.
  - *Backup Configuration* — Downloads the Backup Configuration file, and overwrites it.

To copy configuration:

1. Click **Copy Configuration**. The copy configuration parameters are activated.
2. Select the *Source* file and the *Destination* file.
3. Click **Apply**.

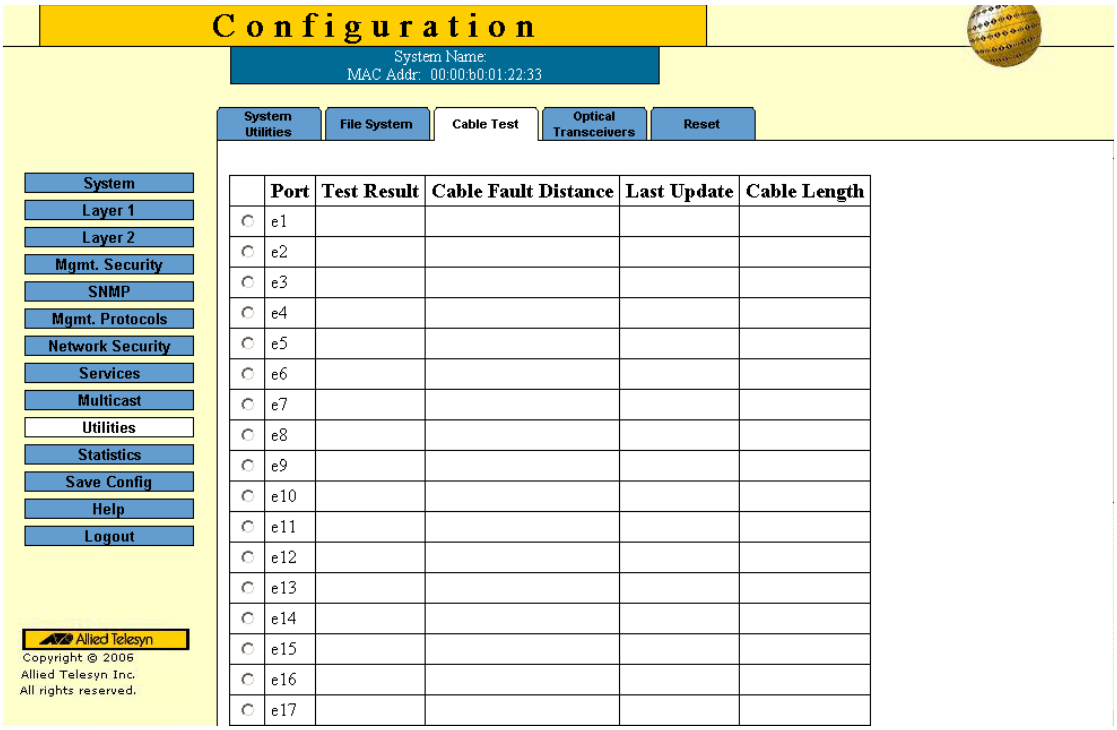
Viewing Integrated Cable Tests

The *Cable Test Page* contains fields for performing tests on copper cables. Cable testing provides diagnostic information about where errors occurred in the cable, the last time a cable test was performed, and the type of cable error that occurred. The tests use Time Domain Reflectometry (TDR) technology to test the quality and characteristics of a copper cable attached to a port. Cables up to 120 meters long can be tested. Cables are tested when the ports are in the down state, with the exception of the Approximated Cable Length test.

To perform a copper cable test:

1. Click **Utilities > Cable Test**. The *Cable Test Page* opens:

Figure 93: Cable Test Page



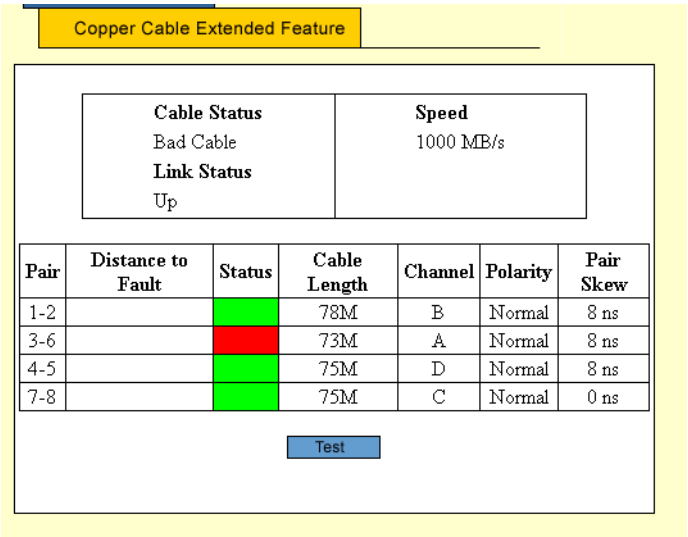
The *Cable Test Page* displays the following information:

- **Unit Number** — Indicates the stacking member for which the Ethernet ports information is displayed.
- **Port** — Specifies the port to which the cable is connected.
- **Test Result** — Displays the cable test results. Possible values are:
  - *No Cable* — Indicates that a cable is not connected to the port.
  - *Open Cable* — Indicates that a cable is connected on only one side.
  - *Short Cable* — Indicates that a short has occurred in the cable.
  - *OK* — Indicates that the cable passed the test.
- **Cable Fault Distance** — Indicates the distance from the port where the cable error occurred.
- **Last Update** — Indicates the last time the port was tested.

- **Cable Length** — Indicates the approximate cable length. This test can only be performed when the port is up and operating at 1 Gbps.

2. Select the *Unit Number*, and the *Port.*
3. Click **Test**. The cable test is performed.
4. Click Advanced. The *Copper Cables Extended Feature Page* opens, and the copper cable test results are displayed.

Figure 94: Copper Cables Extended Feature Page



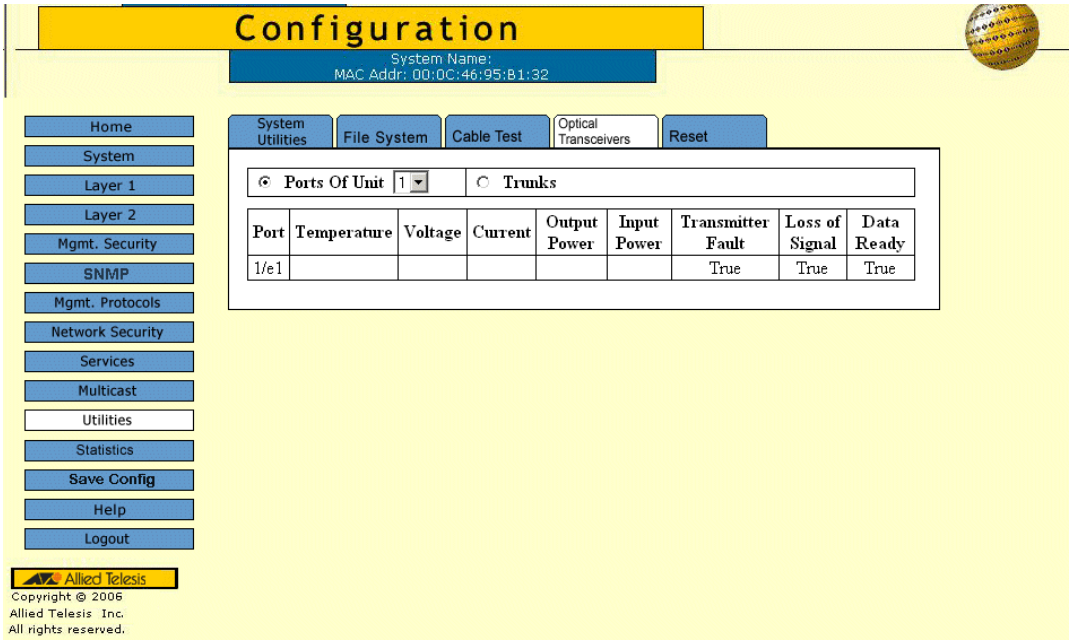
Viewing Optical Transceivers

The *Optical Transceivers Page* allows network managers to perform tests on Fiber Optic cables. Optical transceiver diagnostics can be performed only when the link is present.

To view transceiver diagnostics:

1. Click **Utilities > Optical Transceivers**. The *Optical Transceivers Page* opens:

Figure 95: Optical Transceivers Page



The *Optical Transceivers Page* contains the following fields:

- **Ports of Unit** — Indicates the unit port IP on which the cable is tested.
- **Trunks** — Indicates the LAG on which the cable is tested.
- **Port** — Displays the port IP address on which the cable is tested.
- **Temperature** — Displays the temperature (^{o}C) at which the cable is operating.
- **Voltage** — Displays the voltage at which the cable is operating.
- **Current** — Displays the current at which the cable is operating.
- **Output Power** — Indicates the rate at which the output power is transmitted.
- **Input Power** — Indicates the rate at which the input power is transmitted.
- **Transmitter Fault** — Indicates if a fault occurred during transmission.
- **Loss of Signal** — Indicates if a signal loss occurred in the cable.
- **Data Ready** — Indicates the transceiver has achieved power up and data is ready.

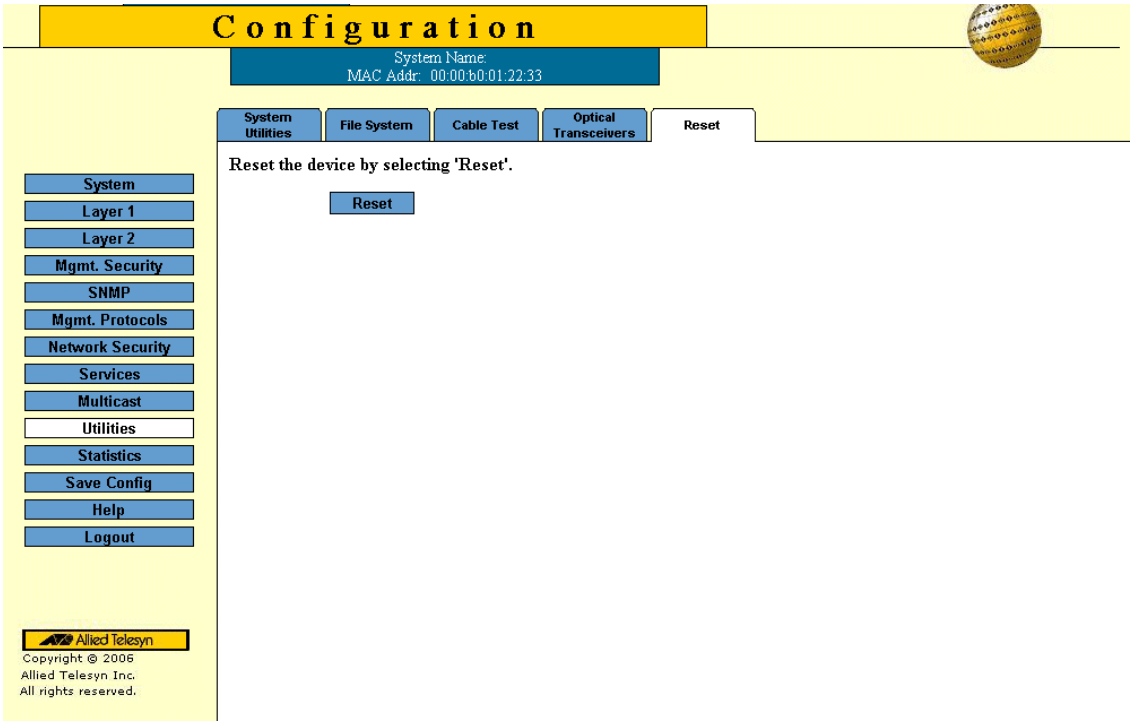
Resetting the Device

Restoring the Default Configuration File?

To reset the device:

1. Click **Utilities > Reset**. The *Reset Page* opens.

Figure 96: Reset Page



2. Select the **Reset Unit No.**
3. Click **Reset**. The confirmation message appears informing that reset ends the management session.
4. Click **OK**. The device is reset.

Section 14. Viewing Statistics

This section provides device statistics for RMON, interfaces, and Etherlike. This section contains the following topics:

- Viewing Interface Statistics
- Managing RMON Statistics

Viewing Interface Statistics

This section contains the following topics:

- Viewing Interface Statistics
- Viewing Etherlike Statistics
- Select the Interface and the Refresh Rate. The selected interface's Etherlike statistics are displayed.

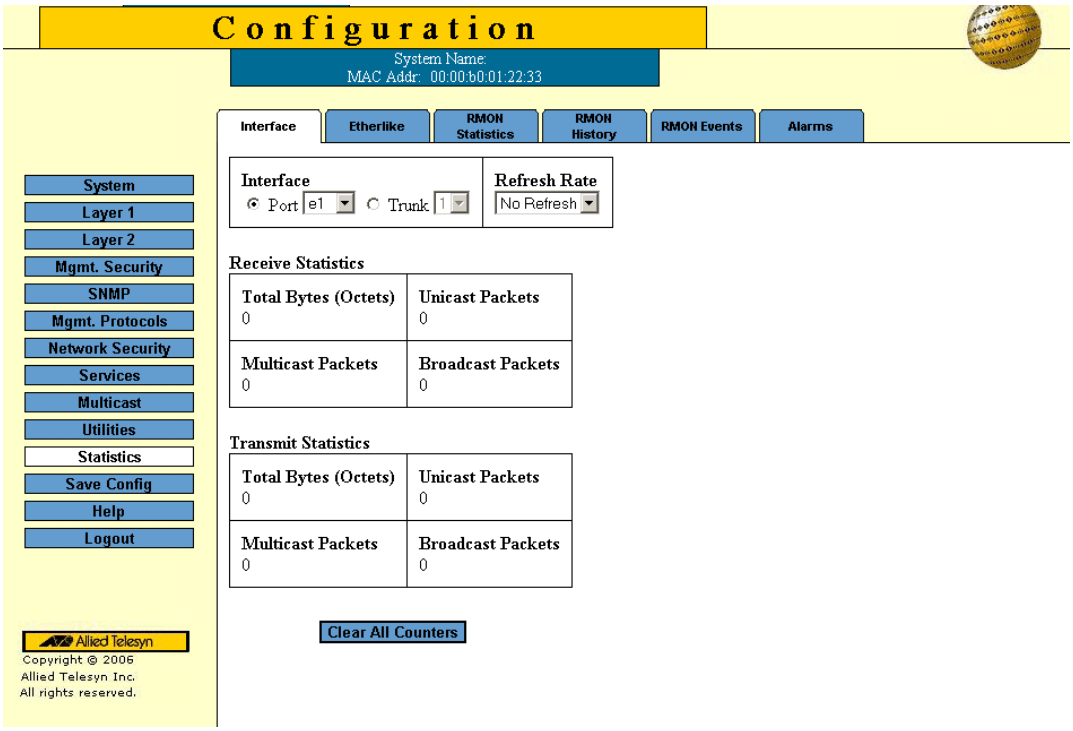
Viewing Interface Statistics

The Interface page contains statistics for both received and transmitted packets.

To view interface statistics:

1. Click **Statistics > Interface**. The *Interface Statistics Page* opens:

Figure 97: Interface Statistics Page



The *Interface Statistics Page* contains the following fields:

- **Interface** — Indicates the device for which statistics are displayed. The possible field values are:
  - *Port of Unit* — Defines the specific port for which interface statistics are displayed.
  - *Trunk* — Defines the specific LAG for which interface statistics are displayed..

- **Refresh Rate** — Defines the frequency of the interface statistics updates. The possible field values are:
  - *15 Sec* — Indicates that the Interface statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the Interface statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the Interface statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the Interface statistics are not refreshed.

Receive Statistics

- **Total Bytes (Octets)** — Displays the number of octets received on the selected interface.
- **Unicast Packets** — Displays the number of Unicast packets received on the selected interface.
- **Multicast Packets** — Displays the number of Multicast packets received on the selected interface.
- **Broadcast Packets** — Displays the number of Broadcast packets received on the selected interface.
- **Packets with Errors** — Displays the number of error packets received from the selected interface.

Transmit Statistics

- **Total Bytes (Octets)** — Displays the number of octets transmitted from the selected interface.
- **Unicast Packets** — Displays the number of Unicast packets transmitted from the selected interface.
- **Multicast Packets** — Displays the number of Multicast packets transmitted from the selected interface.
- **Broadcast Packets** — Displays the number of Broadcast packets transmitted from the selected interface.

2. Select the *Interface* and the *Refresh Rate*. The selected interface's Interface statistics are displayed.

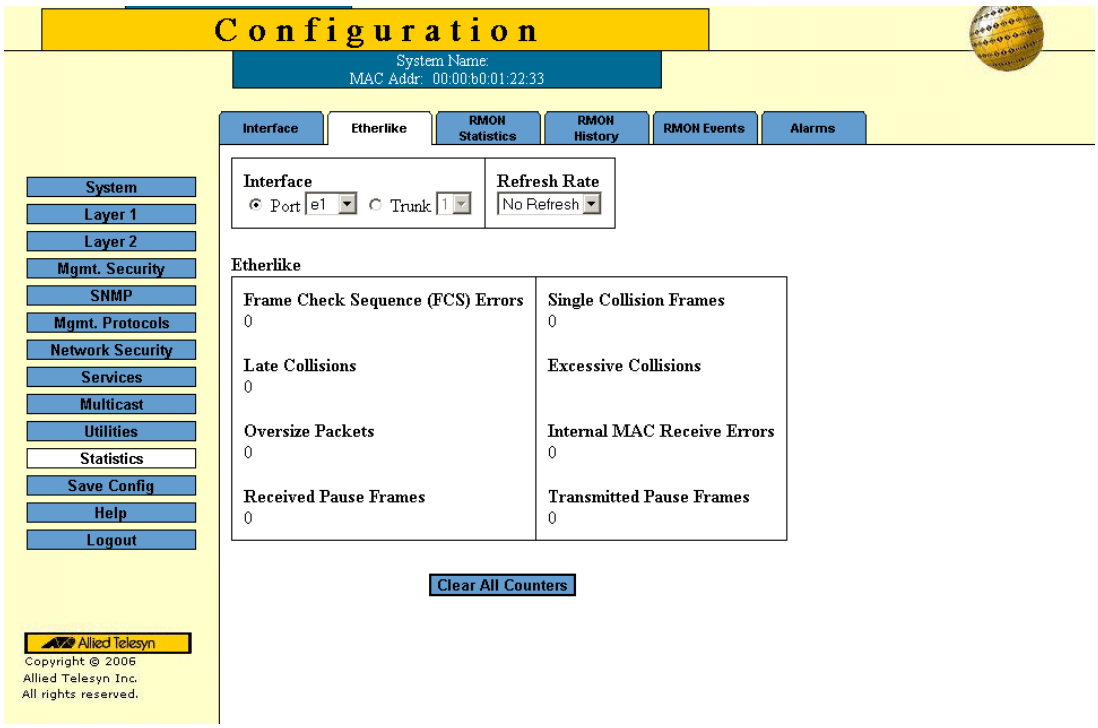
Viewing Etherlike Statistics

The *Etherlike Statistics Page* displays interface statistics.

To view Etherlike statistics:

1. Click **Statistics > Etherlike.** The *Etherlike Statistics Page* page opens:

Figure 98: Etherlike Statistics Page



The *Etherlike Statistics Page* contains the following fields:

- **Interface** — Indicates the device for which statistics are displayed. The possible field values are:
  - *Port of Unit*— Defines the specific port for which Etherlike statistics are displayed.
  - *Trunk* — Defines the specific LAG for which Etherlike statistics are displayed.
- **Refresh Rate** — Defines the frequency of the interface statistics updates. The possible field values are:
  - *15 Sec* — Indicates that the Etherlike statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the Etherlike statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the Etherlike statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the Etherlike statistics are not refreshed.

- **Frame Check Sequence (FCS) Errors** — Displays the number of FCS errors received on the selected interface.
- **Single Collision Frames** — Displays the number of single collision frames received on the selected interface.
- **Late Collisions** — Displays the number of late collision frames received on the selected interface.
- **Excessive Collisions** — Displays the number of excessive collisions received on the selected interface.
- **Oversize Packets** — Displays the number of oversized packet errors on the selected interface.
- **Internal MAC Receive Errors** — Displays the number of internal MAC received errors on the selected interface.
- **Received Pause Frames** — Displays the number of received paused frames on the selected interface.
- **Transmitted Paused Frames** — Displays the number of paused frames transmitted from the selected interface.

2. Select the *Interface* and the *Refresh Rate*. The selected interface's Etherlike statistics are displayed.

To update the refresh time:

- To change the refresh rate for statistics, select another rate from the *Refresh Rate* dropdown list.

To reset Etherlike interface statistics counters:

1. Open the *Etherlike Statistics Page*.
2. Click **Clear All Counters**. The Etherlike interface statistics counters are cleared.

Managing RMON Statistics

This section contains the following topics:

- Viewing RMON Statistics
- Configuring RMON History
- Configuring RMON Events
- Defining RMON Alarms

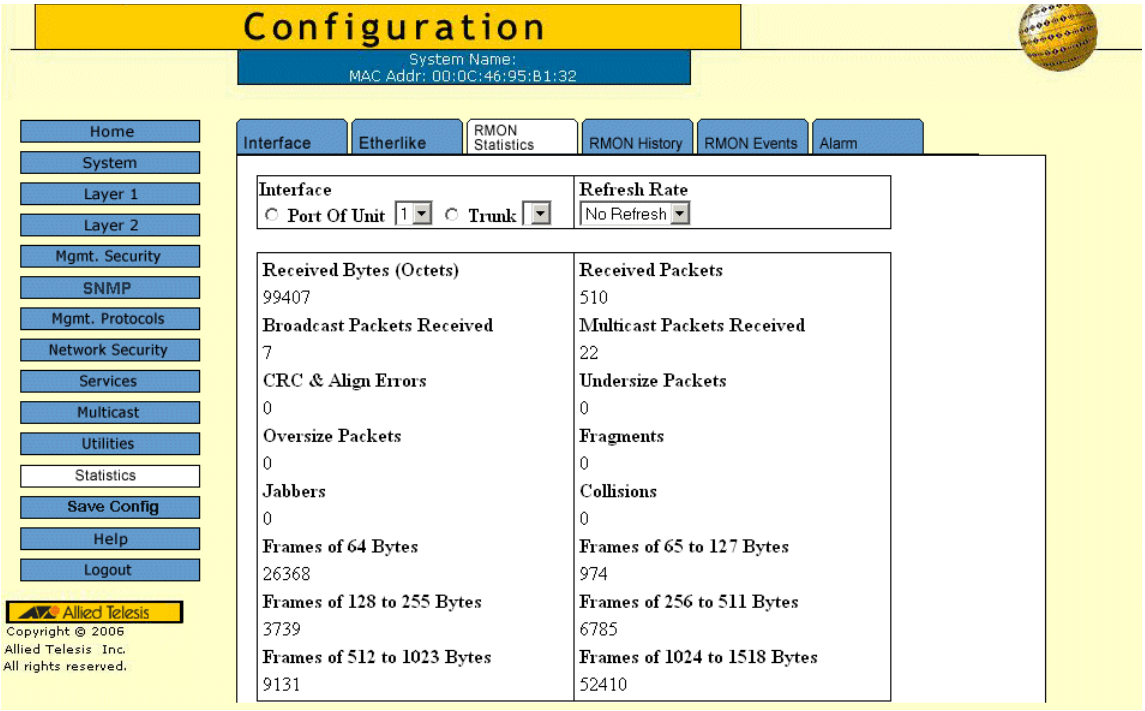
Viewing RMON Statistics

The *RMON Statistics Page* contains fields for viewing information about device utilization and errors that occurred on the device. The *RMON Statistics Page* contains statistics for both received and transmitted packets.

To view RMON statistics:

1. Click **Statistics > RMON Statistics**. The *RMON Statistics Page* opens:

Figure 99: RMON Statistics Page



The *RMON Statistics Page* contains the following fields:

- **Interface** — Indicates the device for which statistics are displayed. The possible field values are:
  - *Port of Unit*— Defines the specific port for which RMON statistics are displayed.
  - *Trunk* — Defines the specific LAG for which RMON statistics are displayed.
- **Refresh Rate** — Defines the frequency of the interface statistics updates. The possible field values are:
  - *15 Sec* — Indicates that the RMON statistics are refreshed every 15 seconds.

  - *30 Sec* — Indicates that the RMON statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the RMON statistics are refreshed every 60 seconds.
  - *No Refresh*—Indicates that the RMON statistics are not refreshed.

- **Received Bytes (Octets)** — Displays the number of octets received on the interface since the device was last refreshed. This number includes bad packets and FCS octets, but excludes framing bits.
- **Received Packets** — Displays the number of packets received on the interface, including bad packets, Multicast and broadcast packets, since the device was last refreshed.
- **Broadcast Packets Received** — Displays the number of good broadcast packets received on the interface since the device was last refreshed. This number does not include Multicast packets.
- **Multicast Packets Received** — Displays the number of good Multicast packets received on the interface since the device was last refreshed.
- **CRC & Align Errors** — Displays the number of CRC and Align errors that have occurred on the interface since the device was last refreshed.
- **Undersize Packets** — Displays the number of undersized packets (less than 64 octets) received on the interface since the device was last refreshed.
- **Oversize Packets** — Displays the number of oversized packets (over 1518 octets) received on the interface since the device was last refreshed.
- **Fragments** — Displays the number of fragments (packets with less than 64 octets, excluding framing bits, but including FCS octets) received on the interface since the device was last refreshed.
- **Jabbers** — Displays the total number of received packets that were longer than 1518 octets. This number excludes frame bits, but includes FCS octets that had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral octet (Alignment Error) number. The field range to detect jabbers is between 20 ms and 150 ms.
- **Collisions** — Displays the number of collisions received on the interface since the device was last refreshed.
- **Frames of *xx* Bytes** — Displays the number of *xx*-byte frames received on the interface since the device was last refreshed.

2. Select the *Interface* and the *Refresh Rate*. The selected interface's RMON statistics are displayed.

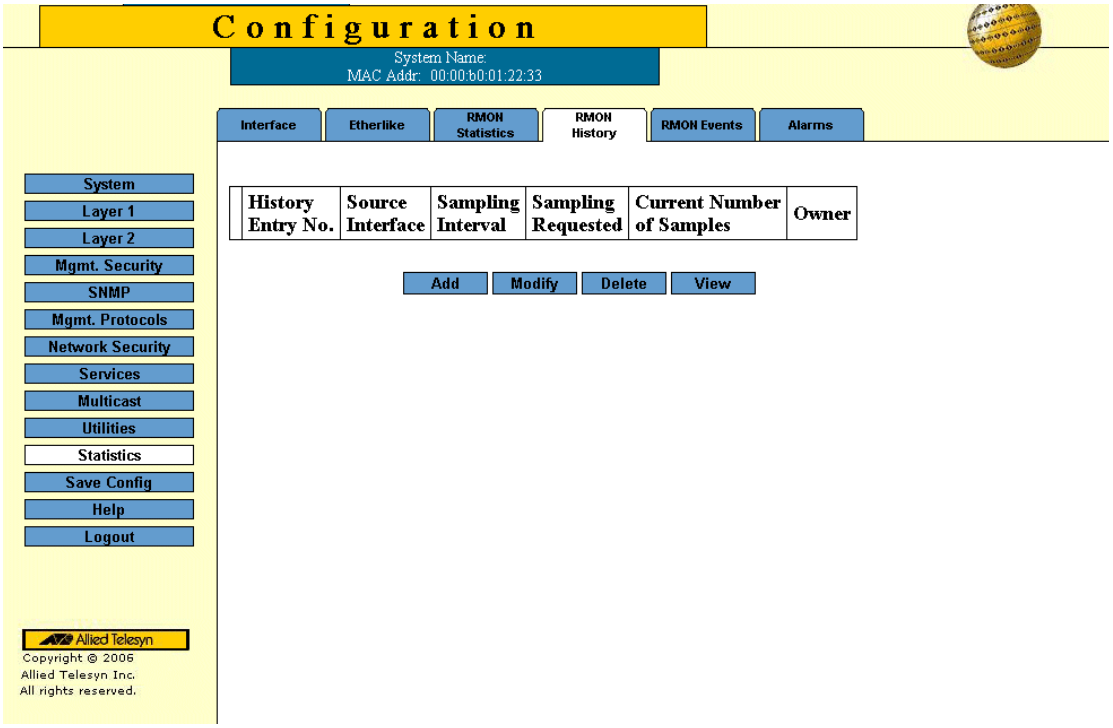
Configuring RMON History

The *RMON History Page* contains information about samples of data taken from ports. For example, the samples may include interface definitions or polling periods.

To view RMON history information:

1. Click **Statistics > RMON History**. The *RMON History Page* opens:

Figure 100: RMON History Page

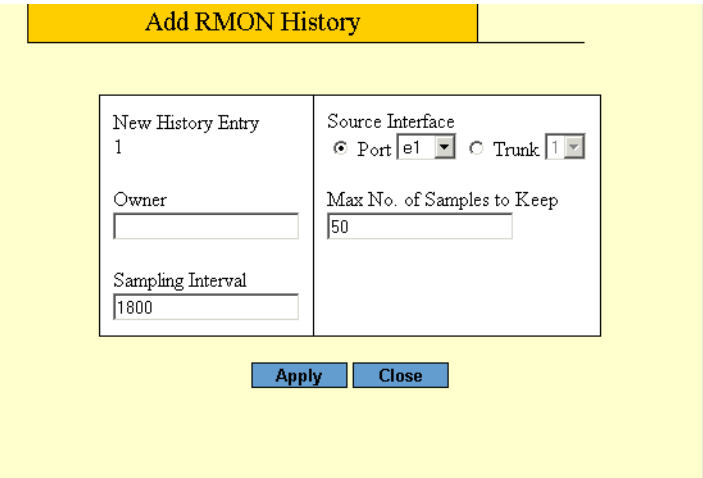


The *RMON History Page* contains the following fields:

- **History Entry No.** — Displays the history control entry number.
- **Source Interface** — Displays the interface from which the history samples were taken. The possible field values are:
  - *Port* — Specifies the port from which the RMON information was taken.
  - *LAG* — Specifies the port from which the RMON information was taken.
- **Sampling Interval** — Indicates in seconds the time period that samplings are taken from the ports. The field range is 1-3600. The default is 1800 seconds (equal to 30 minutes).
- **Sampling Requested**— Displays the number of samples to be saved. The field range is 1-65535. The default value is 50.
- **Current Number of Samples** — Displays the current number of samples taken.
- **Owner** — Displays the RMON station or user that requested the RMON information. The field range is 0-20 characters.

2. Click **RMON History**. The *Create History Entry Page* opens:

Figure 101: Create History Entry Page

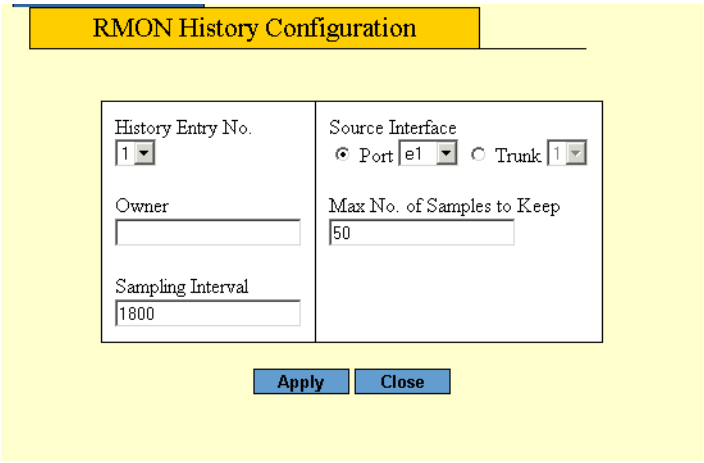


3. Define the *Source Interface*, *Owner*, *Max. No. of Samples to Keep*, *and Sampling Interval* fields.
4. Click **Apply.** The new entry is added to the history table, and the device is updated.

To edit an RMON history entry:

1. Click **Statistics > RMON History**. The *RMON History Page* opens.
2. Click **Modify**. The *History Control Settings Page* opens:

Figure 102: History Control Settings Page



3. Define the fields.
4. Click **Apply.** The new entry is added to the history table, and the device is updated.

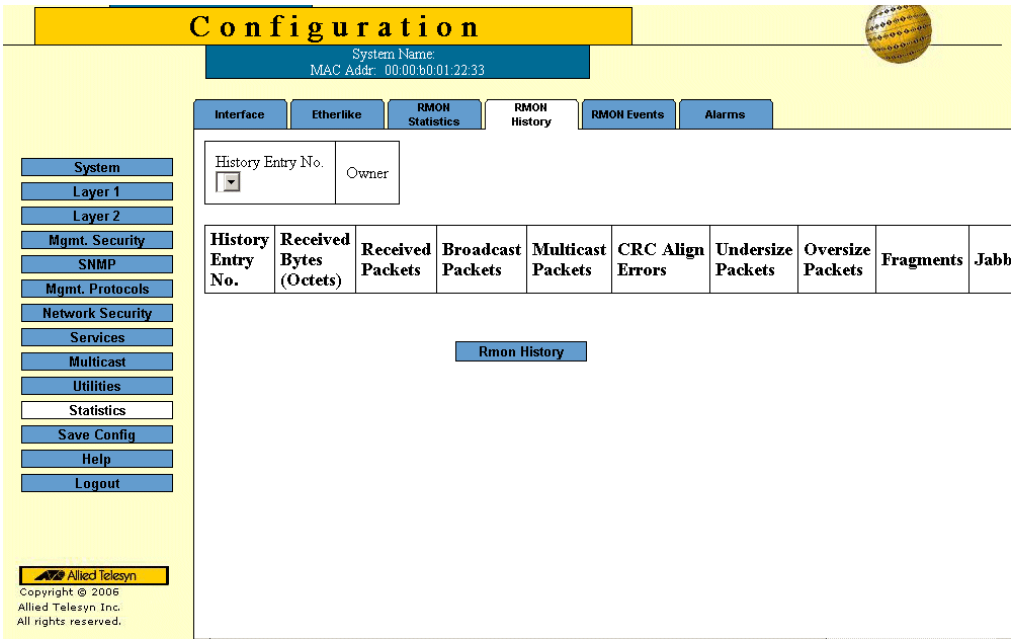
Viewing the RMON History Table

The *RMON History Table Page* contains interface specific statistical network samplings. Each table entry represents all counter values compiled during a single sample.

To view the RMON History Table:

1. Click **Statistics > RMON History**. The *RMON History Page* opens.
2. Click **View**. The *RMON History Table Page* opens:

Figure 103: RMON History Table Page



The *RMON History Table Page* contains the following fields:

- **History Entry No.** — Displays the history table entry number.
- **Owner** — Displays the RMON station or user that requested the RMON information. The field range is 0-20 characters.
- **Sample No.** — Indicates the sample number from which the statistics were taken.
- **Drop Events** — Displays the number of dropped events that have occurred on the interface since the device was last refreshed.
- **Received Bytes (Octets)** — Displays the number of octets received on the interface since the device was last refreshed. This number includes bad packets and FCS octets, but excludes framing bits.
- **Received Packets** — Displays the number of packets received on the interface since the device was last refreshed, including bad packets, Multicast and Broadcast packets.
- **Broadcast Packets** — Displays the number of good Broadcast packets received on the interface since the device was last refreshed. This number does not include Multicast packets.
- **Multicast Packets** — Displays the number of good Multicast packets received on the interface since the device was last refreshed.
- **CRC Align Errors** — Displays the number of CRC and Align errors that have occurred on the interface since the device was last refreshed.

- **Undersize Packets** — Displays the number of undersized packets (less than 64 octets) received on the interface since the device was last refreshed.
- **Oversize Packets** — Displays the number of oversized packets (over 1518 octets) received on the interface since the device was last refreshed.
- **Fragments** — Displays the number of fragments (packets with less than 64 octets, excluding framing bits, but including FCS octets) received on the interface since the device was last refreshed.
- **Jabbers** — Displays the total number of received packets that were longer than 1518 octets. This number excludes frame bits, but includes FCS octets that had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral octet (Alignment Error) number. The field range to detect jabbers is between 20 ms and 150 ms.
- **Collisions** — Displays the number of collisions received on the interface since the device was last refreshed.
- **Utilization** — Displays the percentage of the interface utilized.

3. Select an entry in the *History Entry No.* field.
4. Select the sample number. The statistics are displayed.
5. Click **RMON History** to return to the *RMON History Page*.

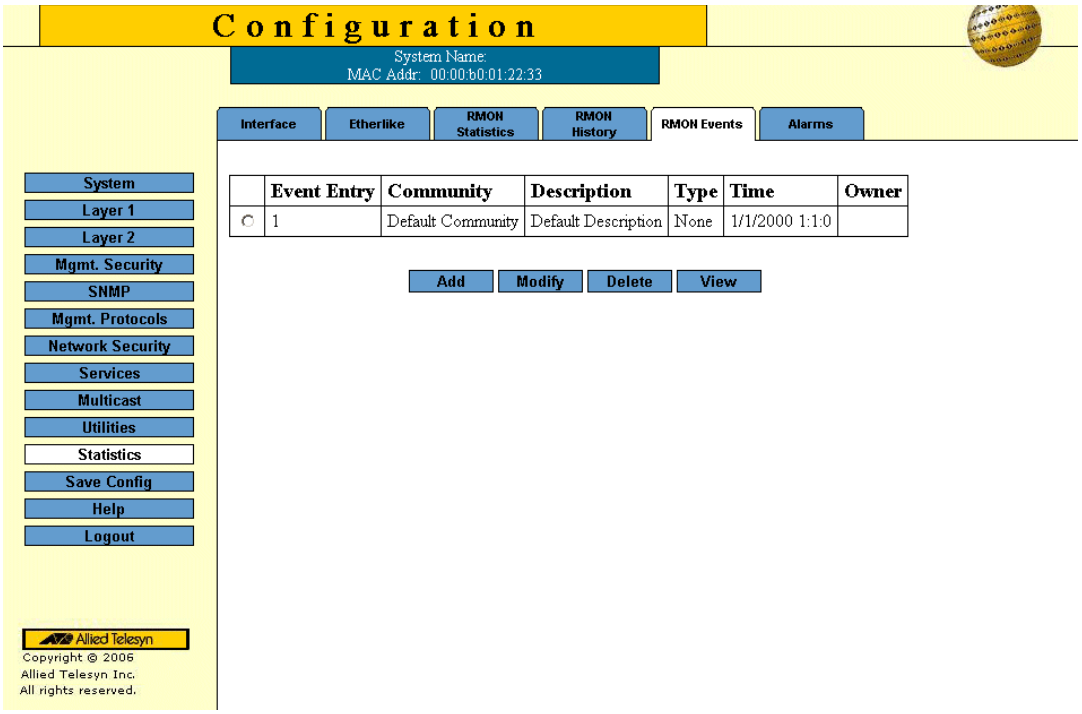
Configuring RMON Events

TThe *RMON Events Page* contains fields for defining, modifying and viewing RMON events statistics.

To add an RMON event:

1. Click **Statistics > RMON Events**. The *RMON Events Page* opens:

Figure 104: RMON Events Page

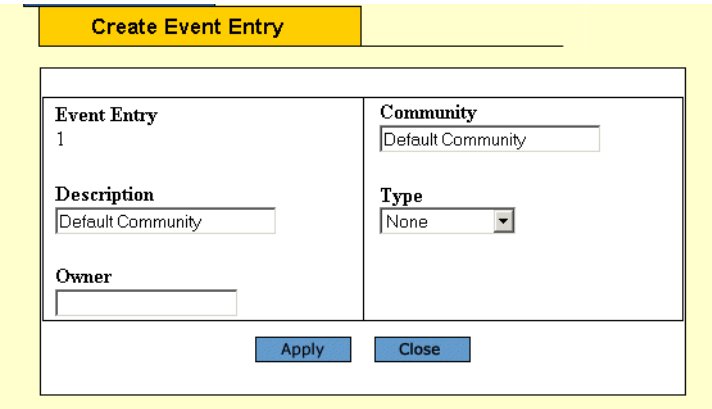


The *RMON Events Page* contains the following fields:

- **Event Entry** — Displays the event.
- **Community** — Displays the community to which the event belongs.
- **Description** — Displays the user-defined event description.
- **Type** — Describes the event type. Possible values are:
  - *Log* — Indicates that the event is a log entry.
  - *Trap* — Indicates that the event is a trap.
  - *Log and Trap* — Indicates that the event is both a log entry and a trap.
  - *None* — Indicates that no event occurred.
- **Time** — Displays the time that the event occurred.
- **Owner** — Displays the device or user that defined the event.

2. Click **Create**. The *Create Event Entry Page* opens:

Figure 105: Create Event Entry Page

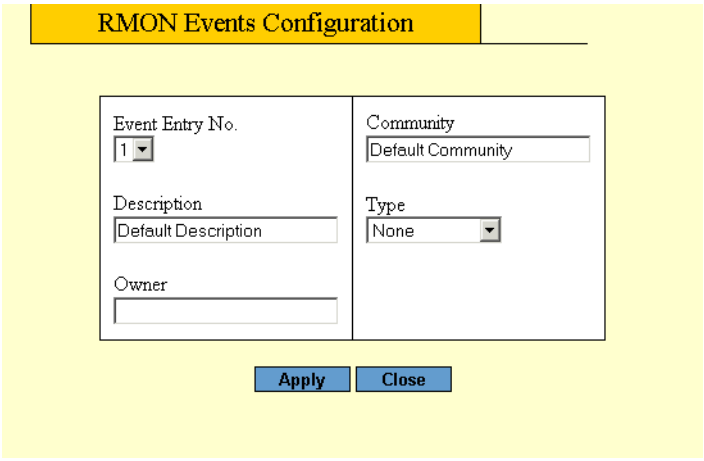


3. Define the *Community*, *Description*, *Type* and *Owner* fields.
4. Click **Apply**. The event entry is added and the device is updated.

To modify the RMON Event entry settings:

1. Click **Statistics > RMON Events**. The *RMON Events Page* opens.
2. Click **Modify**. The *Event Control Settings Page* opens:

Figure 106: Event Control Settings Page



3. Select an event entry and define the fields for the entry.
4. Click **Apply**. The event control settings are saved and the device is updated.

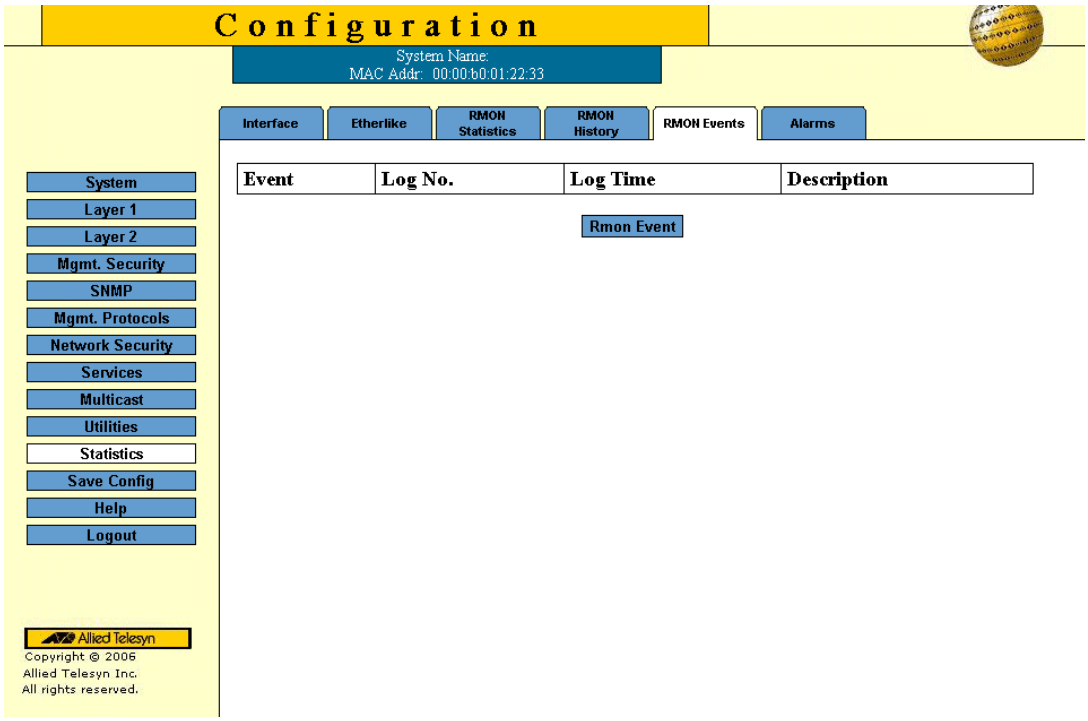
Viewing the RMON Events Logs

The *RMON Events Logs Page* contains interface specific statistical network samplings. Each table entry represents all counter values compiled during a single sample.

To view the RMON Events Table:

1. Click **Statistics > RMON Events**. The *RMON Events Page* opens.
2. Click **View**. The *RMON Events Logs Page* opens:

Figure 107: RMON Events Logs Page



The *RMON Events Logs Page* contains the following event log information:

- **Event** — Displays the RMON Events Log entry number.
- **Log No.** — Displays the log number.
- **Log Time** — Displays the time when the log entry was entered.
- **Description** — Displays the log entry description.

3. Click **RMON Event** to return to the *RMON Events Page*.

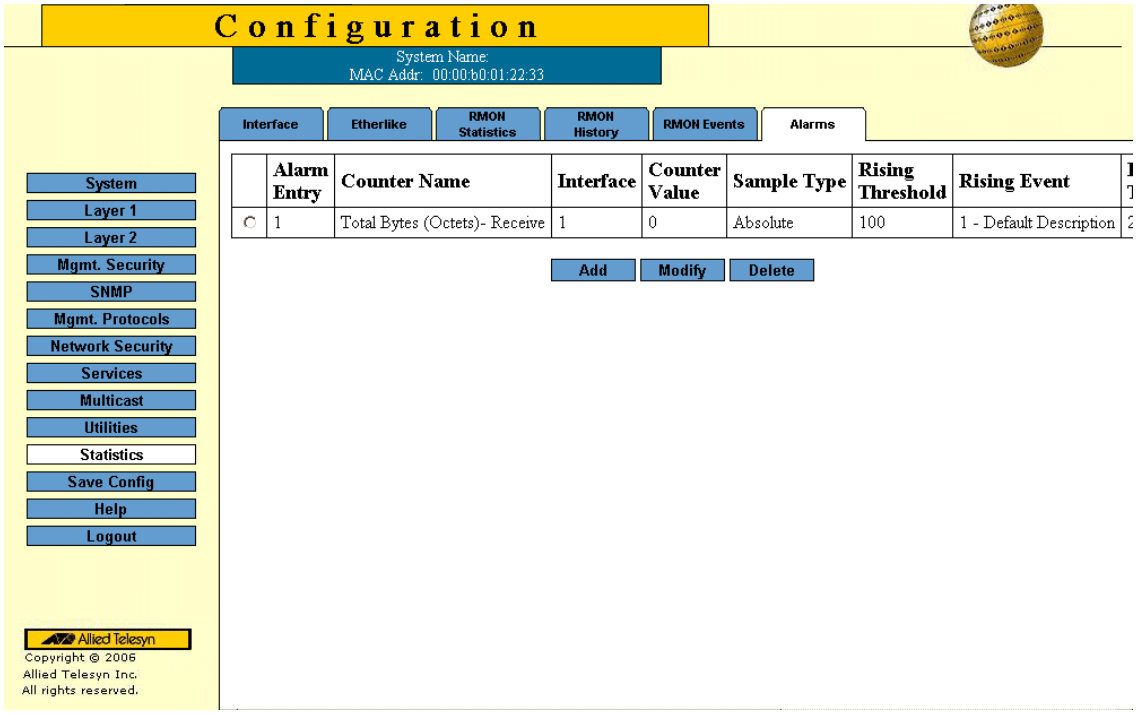
Defining RMON Alarms

The *RMON Alarm Page* contains fields for setting network alarms. Network alarms occur when a network problem, or event, is detected. Rising and falling thresholds generate events.

To set RMON alarms:

1. Click **Statistics > Alarm**. The *RMON Alarm Page* opens:

Figure 108: RMON Alarm Page



The *RMON Alarm Page* contains the following fields:

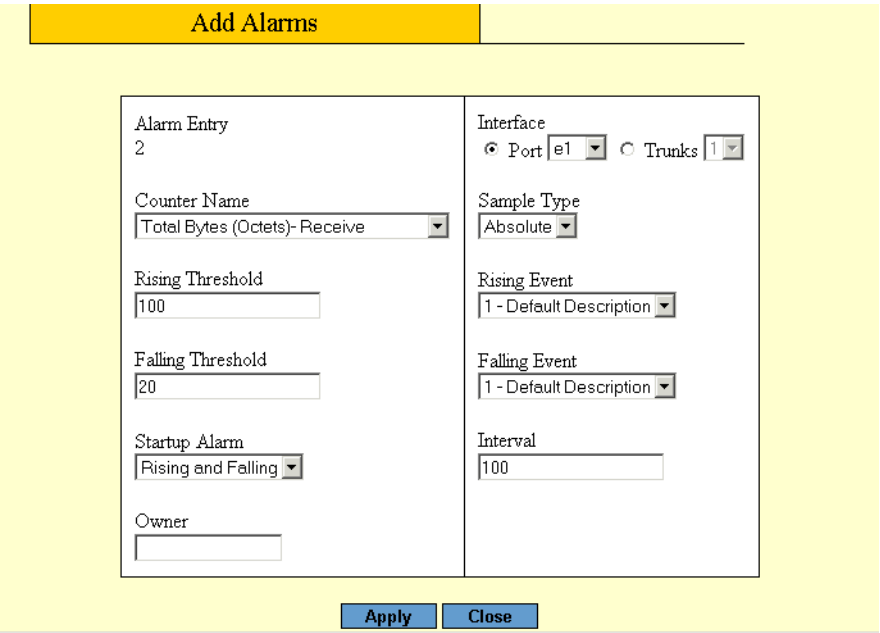
- **Alarm Entry** — Indicates a specific alarm.
- **Counter Name** — Displays the selected MIB variable.
- **Interface** — Displays interface for which RMON statistics are displayed. The possible field values are:
  - *Port* — Displays the RMON statistics for the selected port.
  - *LAG* — Displays the RMON statistics for the selected LAG.
- **Counter Value** — Displays the selected MIB variable value.
- **Sample Type** — Defines the sampling method for the selected variable and comparing the value against the thresholds. The possible field values are:
  - *Delta* — Subtracts the last sampled value from the current value. The difference in the values is compared to the threshold.

  - *Absolute* — Compares the values directly with the thresholds at the end of the sampling interval.

- **Rising Threshold** — Displays the rising counter value that triggers the rising threshold alarm. The rising threshold is presented on top of the graph bars. Each monitored variable is designated a color.
- **Rising Event** — Displays the mechanism in which the alarms are reported. The possible field values are:
  - *LOG* — Indicates there is not a saving mechanism for either the device or in the management system. If the device is not reset, the entry remains in the Log Table.
  - *TRAP* — Indicates that an SNMP trap is generated, and sent via the Trap mechanism. The Trap can also be saved using the Trap mechanism.
  - *Both* — Indicates that both the Log and Trap mechanism are used to report alarms.
- **Falling Threshold** — Displays the falling counter value that triggers the falling threshold alarm. The falling threshold is graphically presented on top of the graph bars. Each monitored variable is designated a color.
- **Falling Event** — Displays the mechanism in which the alarms are reported.
- **Startup Alarm** — Displays the trigger that activates the alarm generation. Rising is defined by crossing the threshold from a low-value threshold to a higher-value threshold.
- **Interval (sec)** — Defines the alarm interval time in seconds.
- **Owner** — Displays the device or user that defined the alarm.

2. Click **Create**. The *Add Alarm Page* opens:

Figure 109: Add Alarm Page



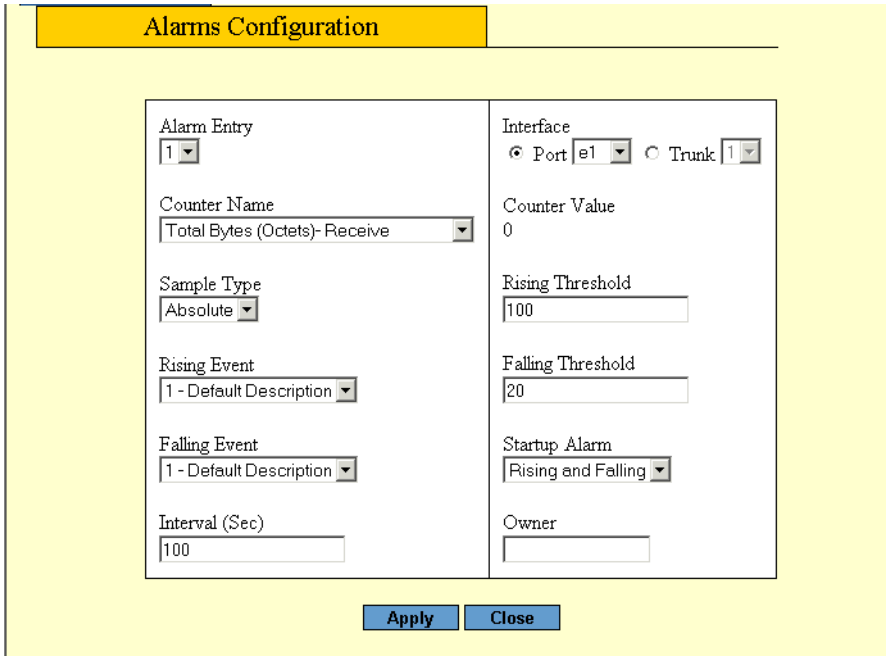
3. Define the *Interface*, *Counter Name, Sample Type*, *Rising Threshold*, *Rising Event*, *Falling Threshold*, *Falling Event*, *Startup Alarm*, *Interval*, and *Owner* fields.
4. Click **Apply**. The RMON alarm is added, and the device is updated.

To modify RMON alarms:

1. Click **Statistics > Alarm**. The *RMON Alarm Page* opens.

2. Click **Modify**. The *RMON Alarm Settings Page* opens:

Figure 110: RMON Alarm Settings Page



3. Define the fields.
4. Click **Apply**. The RMON alarm is saved, and the device is updated.

Section 15. Managing Stacking

This section describes the stacking control management and includes the following topics:

- Stacking Overview
- Configuring Stacking Management

Stacking Overview

Stacking provides multiple switch management through a single point as if all stack members are a single unit. All stack members are accessed through a single IP address through which the stack is managed. The stack can be managed using the following interfaces:

- Web-based Interface
- SNMP Management Station
- Command Line Interface (CLI)

Devices support stacking up to six units per stack, or can operate as stand-alone units. During the Stacking setup, one switch is selected as the Stacking Master and another stacking member can be selected as the Secondary Master. All other devices are selected as stack members, and assigned a unique Unit ID.

Switch software is downloaded separately for each stack member. However, all units in the stack must be running the same software version.

Switch stacking and configuration is maintained by the Stacking Master. The Stacking Master detects and reconfigures the ports with minimal operational impact in the event of:

- Unit Failure
- Inter-unit Stacking Link Failure
- Unit Insertion
- Removing a Stacking Unit

This section includes the following topics:

- Stacking Ring Topology
- Stacking Chain Topology
- Stacking Members and Unit ID
- Removing and Replacing Stacking Members
- Exchanging Stacking Members

Stacking Ring Topology

Stacked devices operate in a Ring topology. A Ring topology is where all devices in the stack are connected to each other forming a circle. Each stacked device accepts data and sends it to the device to which it is physically connected. The packet continues through the stack until it reaches the destination port. The system automatically discovers the optimal path on which to send traffic.

Most difficulties in Ring topologies occur when a device in the ring becomes non-functional, or a link is severed. In a stack, the system automatically switches to a Stacking Failover topology without any system downtime. An SNMP message is automatically generated, but no stack management action is required. However, the stacking link or stacking member must be repaired to ensure the stacking integrity.

After the stacking issues are resolved, the device can be reconnected to the stack without interruption, and the Ring topology is restored.

Stacking Chain Topology

If a failure occurs in the stacking topology, the stack reverts to Stacking Chain Topology. In the Chain topology, devices operate in a chain formation. The Stacking Master determines where the packets are sent. Each unit is connected to two neighboring devices, except for the top and bottom units.

Stacking Members and Unit ID

Stacking Unit IDs are essential to the stacking configuration. The stacking operation is determined during the boot process. The Operation Mode is determined by the Unit ID selected during the initialization process. For example, if the user selected stand-alone mode, the device boots as a stand-alone device.

The device units are shipped with the default Unit ID of the stand-alone unit. If the device is operating as a stand-alone unit, all stacking LEDs are off. Once the user selects a different Unit ID, the default Unit ID is not erased, and remains valid, even if the unit is reset.

Unit ID 1 and Unit ID 2 are reserved for Master-enabled units. Unit IDs 3 to 6 can be defined for stack members.

When the Stacking Master unit boots, or when inserting or removing a stack member, the Stacking Master initiates a stacking discovering process.

If two members are discovered with the same Unit ID, the stack continues to function, however only the unit with the older join time joins the stack. A message is sent to the user, notifying that a unit failed to join the stack.

For first time Unit ID assignment, see the *Installation Guide*.

Removing and Replacing Stacking Members

Stacking member 1 and stacking member 2 are Master-enabled units. Unit 1 and Unit 2 are either designated as Stacking Master or Secondary Master. The Stacking Master assignment is performed during the configuration process. One Master-enabled stack member is elected Stacking Master, and the other Master-enabled stack member is elected Secondary Master, according to the following decision process:

If only one Master-enabled unit is present, it is elected Stacking Master.

If two Master-enabled stacking members are present, and one has been manually configured as the Stacking Master, the manually configured member is elected Stacking Master.

If two Master-enabled units are present and neither has been manually configured as the Stacking Master, the one with the longer up-time is elected Stacking Master.

If the two Master-enabled stacking members are the same age, Unit 1 is elected Stacking Master.

Two stacking member are considered the same age if they were inserted within the same ten minute interval.

For example, if Stack member 2 is inserted in the first minute of a ten-minute cycle, and Stack member 1 is inserted in fifth minute of the same cycle, the units are considered the same age. If there are two Master-enabled units that are the same age, then Unit 1 is elected Stacking Master.

The Stacking Master and the Secondary Master maintain a Warm Standby. The Warm Standby ensures that the Secondary Master takes over for the Stacking Master if a failover occurs. This guarantees that the stack continues to operate normally.

During the Warm Standby, the Master and the Secondary Master are synchronized with the static configuration only. When the Stacking Master is configured, the Stacking Master must synchronize the Secondary Master. The Dynamic configuration is not saved, for example, dynamically learned MAC addresses are not saved.

Each port in the stack has a specific Unit ID, port type, and port number, which are part of both the configuration commands and the configuration files. Configuration files are managed only from the device Stacking Master, including:

- Saving to the Flash
- Uploading configuration files to an external TFTP Server
- Downloading configuration files from an external TFTP Server

Whenever a reboot occurs, topology discovery is performed, and the Master learns all units in the stack. Unit IDs are saved in the unit and are learned through topology discovery. If a unit attempts to boot without a selected Master, and the unit is not operating in stand-alone mode, the unit does not boot.

Configuration files are changed only through explicit user configuration. Configuration files are not automatically modified when:

- Units are added
- Units are removed
- Units are reassigned Unit IDs
- Units toggle between Stacking mode and Stand-alone mode

Each time the system reboots, the Startup configuration file in the Master unit is used to configure the stack. If a stack member is removed from the stack and then replaced with a unit with the same Unit ID, the stack member is configured with the original device configuration. Only ports which are physically present are displayed in the Web Management Interface home page, and can be configured through the web management system. Non-present ports are configured through the CLI or SNMP interfaces.

Exchanging Stacking Members

If a stack member with the same Unit ID replaces an existing Unit ID with the same Unit ID, the previous device configuration is applied to the inserted stack member. If the new inserted device has either more ports or less ports than the previous device, the relevant port configuration is applied to the new stack member.

The Secondary Master replaces the Stacking Master if the following events occur:

- The Stacking Master fails or is removed from the stack.
- Links from the Stacking Master to the stacking members fails.
- A soft switchover is performed via the web interface or the CLI.

Switching between the Stacking Master and the Secondary Master results in a limited service loss. Any dynamic tables are relearned if a failure occurs. The Running Configuration file is synchronized between the Stacking Master and the Secondary Master, and continues running on the Secondary Master.

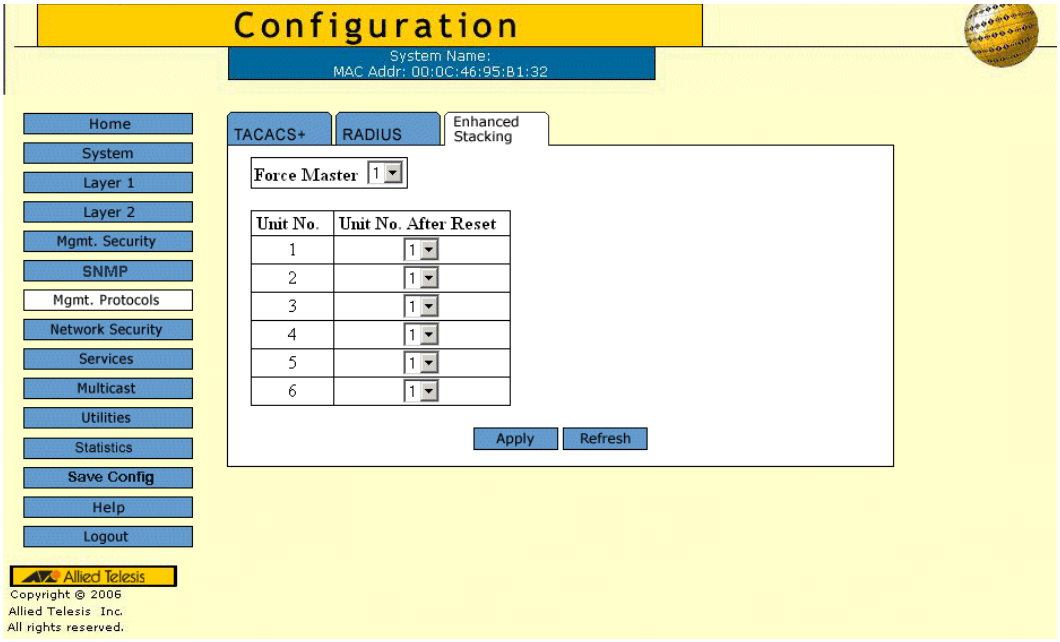
Configuring Stacking Management

The *Enhanced Stacking Page* allows network managers to either reset the entire stack or a specific device. Device configuration changes that are not saved before the device is reset are not saved. If the Stacking Master is reset, the entire stack is reset. In addition, Unit IDs can be changed on the *Enhanced Stacking Page*.

To configure stack control:

1. Click **Mgmt. Protocols > Enhanced Stacking**. The *Enhanced Stacking Page* opens:

Figure 111: Enhanced Stacking Page



The *Enhanced Stacking Page* contains the following stack configuration fields:

- **Force Master** — The unit is forced to be master of the stack. Note that only Unit 1 or Unit 2 can be the stack master.
- **Unit No.** — Indicates the Unit ID assigned to the unit in the current stacking configuration.
- **Unit No. After Reset** — Indicates the Unit ID to be reassigned to the unit in the stacking configuration after reset.

2. Select the master election method, type of ports to be used in stacking,
3. Map/assign the unit numbers.
4. Click **Apply**. A confirmation message displays. The stacking settings are saved and the device configuration is updated.
5. Click **Refresh**. The stacking configuration is applied.
6. Click **Save Config** on the menu to save the changes permanently.

Note

If a different Unit ID is selected, the device must be reset for the configuration changes are active.

Appendix A. Downloading Software with CLI

This section describes how to download system files, and includes the following topics:

- Connecting a Terminal
- Initial Configuration
- Downloading Software

Connecting a Terminal

Before connecting a device, ensure that the device has been installed according to the instructions described in the *Allied Telesis AT-8000S Installation Guide*.

Once installed the device is connected to a terminal through a console port on the front panel of the 16 port device, 24 port, and the back panel for the 48 port devices. The console connection which enables a connection to a terminal desktop system running a terminal emulation software for monitoring and configuring the device. For a stack, only the Stacking Master is connected.

The terminal must be a VT100 compatible terminal or a desktop or portable system with a serial port and running VT100 terminal emulation software.

To connect a terminal to the device Console port, perform the following:

1. Connect a cable from the device console port to the terminal running VT100 terminal emulation software.
2. Ensure that the terminal emulation software is set as follows:
   a) Select the appropriate port to connect to the device.
   b) Set the data rate to 9600 baud.
   c) Set the data format to 8 data bits, 1 stop bit, and no parity.
   d) Set flow control to none.
   e) Under Properties, select VT100 for Emulation mode.
   f) Select **Terminal keys** for **Function**, **Arrow**, and **Ctrl** keys. Ensure that the setting is for Terminal keys (not Windows keys).

Note

When using HyperTerminal with Microsoft Windows 2000, ensure that you have Windows 2000 Service Pack 2 or later installed. With Windows 2000 Service Pack 2, the arrow keys function properly in HyperTerminal's VT100 emulation. Go to www.microsoft.com for information on Windows 2000 service packs.

CLI can be accessed through the Terminal.

The device is now ready to download the system software.

Initial Configuration

Before a device can download system software, the device must have an initial configuration of IP address and network mask.

Before assigning a static IP address to the device, obtain the following information from the network administrator:

- A specific IP address allocated by the network administrator for the switch to be configured
- Network mask for the network

After making any configuration changes, the new configuration must be saved before rebooting. To save the configuration, enter the following CLI command: The following prompt is displayed:

```
Console# copy running-config startup-config
```

Configuration

The initial configuration, which starts after the device has booted successfully, includes static IP address and subnet mask configuration, and setting user name and privilege level to allow remote management. If the device is to be managed from an SNMP-based management station, SNMP community strings must also be configured. The following basic configurations are required:

- "Static IP Address and Subnet Mask"
- "User Name"

Static IP Address and Subnet Mask

IP interfaces can be configured on each port of the device. After entering the configuration command, it is recommended to check if a port was configured with the IP address by entering the “show ip interface” command.

The commands to configure the device are port specific.

To manage the switch from a remote network, a static route must be configured, which is an IP address to where packets are sent when no entries are found in the device tables. The configured IP address must belong to the same subnet as one of the device IP interfaces.

To configure a static route, enter the required commands at the system prompt as shown in the following configuration example where 101.101.101.101 is the specific management station, and 5.1.1.100 is the static route:

```
Console# configure
Console(config)# interface vlan 1
Console(config-if)# ip address 100.1.1.1 255.255.255.0
Console(config-if)# exit
Console# ip route 192.168.2.0/24 100.1.1.33
```

Note

100.1.1.33 is the IP address of the next hop that can be used to reach the management network 192.168.2.0.

To check the configuration, enter the command “show ip interface” as illustrated in the following example.

```
Console# show ip interface
Proxy ARP is disabled
IP Address                     I/F         Type        Broadcast
                                                       Directed
------------                   ------      ------      ---------
100.1.1.1/24                   vlan 1      static      disable
```

User Name

A user name is used to manage the device remotely, for example through SSH, Telnet, or the Web interface. To gain complete administrative (super-user) control over the device, the highest privilege (15) must be specified.

Note

Only an administrator (super-user) with the highest privilege level (15) is allowed to manage the device through the Web browser interface.

For more information about the privilege level, see the CLI Reference Guide.

The configured user name is entered as a login name for remote management sessions. To configure user name and privilege level, enter the command at the system prompt as shown in the configuration example:

```
Console> enable
Console# configure
Console(config)# username admin password lee privilege 15
```

Downloading Software

For this explanation, the following parameters are going to be used:

- **TFTP Server** — 172.16.101.101
- **System software file** — file1
- **Boot file** — file 2

Standalone Device Software Download

To download software an a standalone device perform the following:

1. Power up the device as described in the *Allied Telesis AT-8000S Installation Guide*. The CLI command prompt is displayed.

```
Console#
```

2. Enter the **copy** command to download the boot file.

```
Console# copy tftp://172.16.101.101/file2.rfb boot

Accessing file 'file2' on 172.16.101.101...
Loading file1 from 172.16.101.101:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
09-Jul-2006 03:15:21 %COPY-W-TRAP: The copy operation was completed successfully
!
Copy: 3329361 bytes copied in 00:03:00 [hh:mm:ss]
```

3. Enter the “bootvar” command to determine which file contains the boot file. By default the inactive image area contains the newly downloaded boot file.

```
Console# show bootvar
Images currently available on the FLASH
image-1 active   (selected for next boot)
image-2 not active
```

4. Enter the “boot system” command to change the booting image to the currently inactive image. In the example it is image 2 which has the latest downloaded boot file.

```
Console# boot system image-2
```

5. Enter the “copy” command to download the system file.

```
Console# copy tftp://172.16.101.101/file1.ros image

Accessing file 'file1' on 172.16.101.101...
Loading file1 from 172.16.101.101:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
09-Jul-2006 03:22:27 %COPY-W-TRAP: The copy operation was completed successfully
!
Copy: 6720861 bytes copied in 00:05:00 [hh:mm:ss]
```

6. Reboot the device. The device boots up with the updated boot and system files.

Stacking Member Software Download

Ensure the stack has been correctly connected as descibed in the *Allied Telesis AT-8000S Installation Guide*.

Downloading software to Stacking Members can be performed in the following ways:

- Download the software to an individual device in the stack. In this example the software is downloaded to the device defined as Stacking Member number 3.
- Download the software to all devices in the stack. The “*” character is used instead of the Stacking Member number.
- The software is downloaded to the device allocated as the Stacking Master, defined as Stacking Member number 1. The software is then copied from the Stacking Master to a specified Stacking Member.

Downloading Software to a Stacking Member

To download software an Stacking Member number 3 perform the following:

1. Power up the stack as described in the *Allied Telesis AT-8000S Installation Guide*. The CLI command prompt is displayed.

```
Console#
```

2. Enter the “copy” command to download the boot file.

```
Console# copy tftp://172.16.101.101/file2.rfb unit://3/boot

Accessing file 'file2' on 172.16.101.101...
Loading file1 from 172.16.101.101:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
09-Jul-2006 03:15:21 %COPY-W-TRAP: The copy operation was completed successfully
!
Copy: 3329361 bytes copied in 00:03:00 [hh:mm:ss]
```

3. Enter the “bootvar” command to determine which file contains the boot file. By default the inactive image area contains the newly downloaded boot file.

```
Console# show bootvar
Images currently available on the FLASH
image-1 active   (selected for next boot)
image-2 not active
```

4. Enter the “boot system” command to change the booting image to the currently inactive image. In the example it is image 2 which has the latest downloaded boot file.

```
Console# boot system image-2
```

5. Enter the “copy” command to download the system file.

```
Console# copy tftp://172.16.101.101/file1.ros unit://3/image

Accessing file 'file1' on 172.16.101.101...
Loading file1 from 172.16.101.101:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
09-Jul-2006 03:22:27 %COPY-W-TRAP: The copy operation was completed successfully
!
Copy: 6720861 bytes copied in 00:05:00 [hh:mm:ss]
```

6. Reboot the devices being updated. The allocated devices boot up with the updated boot and system files.

Copying Software from the Stacking Master to a Stacking Member

To copy the software from the Stacking Master to a specified Stacking Member, number 4 in this example, perform the following:

1. Download the software to the Stacking Master as previously described, using the Stacking Member number 1 instead of number 3, as per the previous example.

2. Enter the “copy” command to copy the software from the Stacking Master to the Stacking Member. To copy the software from the Stacking Master to all the Stacking Members, use the “*” character instead of the Stacking Member number, number 4 in this example.

```
Console# copy unit://1/image unit://4/image
```

3. Reboot the devices being updated. The allocated devices boot up with the updated boot and system files.

Appendix B. System Defaults

This section contians the system defaults, and includes the following topics:

- RS-232 Port Settings
- Port Defaults
- Configuration Defaults
- Security Defaults
- System Time Defaults
- Spanning Tree Defaults
- Address Table Defaults
- VLAN Default
- Trunking Defaults
- Multicast Defaults

RS-232 Port Settings

The following table contains the RS-232 port setting defaults:

Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None
Baud Rate	115,200 bps

Port Defaults

The following are the port defaults:

Head of Line Blocking	Enabled
Back Pressure	Disabled

Configuration Defaults

The following are the initial device configuration defaults:

Default User Name	manager
Default Password	friend
System Name	None
Comments	None
BootP	Enabled
DHCP	Disable

Security Defaults

The following are the system security defaults:

Locked Ports	Disabled
802.1X	Disabled

System Time Defaults

The following is the system time default:

SNTP	Enabled

Spanning Tree Defaults

The following are the spanning tree defaults:

STP	Disabled
STP Port	Disabled
Rapid STP	Disabled
Multiple STP	Disabled

Address Table Defaults

The following the Address Table defaults:

Number of MAC Entires	8,000
MAC Address Aging Time	300 seconds

VLAN Default

The following are the VLAN defaults:

Possible VLANs	256
GVRP	Disabled
Join Timer	20 centiseconds
Leave Timer	60 centiseconds
Leave All Timer	1000 centiseconds

Trunking Defaults

The following are the trunking defaults:

Possible Trunks	8
Possible Ports per Trunk	8
LACP Ports/Trunk	16

Multicast Defaults

The following are the Multicast defaults:

IGMP Snooping	Disable
Maximum Multicast Groups	256

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